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Package of Practices - for High Yields

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INTRODUCTION

This is the FOURTH Edition of the joint publication "Package of Practices for High Yields" brought out by the University of Agricultural Sciences, Bangalore and the State Department of Agriculture, Mysore State. This publication is becoming very popular and there is increasing demand from all the Extension workers of the State. This edition which has brought the research recommendations up-to-date will be able to furnish comprehensive information on the new practices recommended for all important field crops. We hope, that with such revised information, the Extension workers of the State will be able to know up-to-date the scientific information on cultivation of crops for high yields and thus will be able to educate farmers in an effective way.

The information provided in this publication is, however, applicable to average situations and therefore some adjustment might be necessary to suit the specific local conditions.

As usual, this publication is the out-come of a joint meeting of the Scientists of the University of Agricultural Sciences, Bangalore, Officers of the State Department of Agriculture and USAID Advisers which was held from February 23—25, 1972.

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PADDY

Jaya, Suma, IR-8, IR-20 and Jenugudu (J-192) are the five improved varieties suitable for the State.

DURATION

1.	Jaya	140 to 145 days
2.	Suma	120 to 125 days
3.	IR—8	145 to 150 days
4.	IR—20	130 to 135 days
5.	Jenugudu (J-192)	140 to 145 days

IMPORTANT FEATURES

Jaya, IR-8 and IR-20

- They respond well to high levels of fertilizers.
- The plants are dwarf and do not lodge even under high fertility.
- They are non-shedding.
- The proportion of grain to rice is 60% by volume and 76 to 80% by weight.
- The varieties perform well in summer.

Suma and Jenugudu

- They respond well only to medium levels of fertilizers.
- Jenugudu is tall and Suma is dwarf.
- They are fine grained.
- The proportion of grain to rice is about 76 to 78% by weight.

Note: *IR-20 is resistant to Leaf hopper, Bacterial leaf blight and Tungro virus*

SEASON

- Optimum sowing time is as follows :

* Monsoon crop	Before the end of June
* Rabi (Only coastal areas)	Before the end of October
* Summer	Before the end of January

AREA

IR-8, IR-20 & Jaya

Suitable for the entire State during monsoon except coastal and Bangalore areas. Monsoon yields would be low in heavy rain fall areas like Coorg, parts of Hassan and Chickmagalur districts. These are recommended for summer for the entire State.

Suma: This is recommended to Raichur and Bellary areas both for monsoon and summer.

Jenugudu: This is recommended for Mysore, Mandya and Hassan districts for monsoon.

INPUTS PER ACRE

(a) Transplanted

Seed:	* IR-8, IR-20 and Jaya	24 to 28 kgs
	* Suma and Jenugudu	18 to 20 kgs
Organic manure:	Green manure or	4000 kgs.
	Compost	2000 kgs.

Fertilizers

IR-8, IR-20 and Jaya

* For the entire State

(i) For monsoon: 50 kg. N, 25 kg. P_2O_5 and 25 kg. K_2O

(ii) For summer: 60 kg. N 30 kg. P_2O_5 and 30 kg. K_2O

* For Coorg and South Kanara Dists:

40 kg. N, 30 kg. P_2O_5 and 35 kg. K_2O

Suma and Jenugudu:—25 kg. N, 15 kg. P_2O_5 and 15 kg. K_2O

Note: * Fertilizer recommendations should be based on soil tests.
* These figures do not include fertilizers for nursery.

(b) Drill sown

Seed: 30 to 35 kgs.

Organic manure: Farm Yard Manure or compost: 4000 kgs.

Fertilizers

IR-8, IR-20 and Jaya: 50 kg. N, 25 kg. P_2O_5 and 25 kg. K_2O (50% N as basel dose and 50% N as top dressing)

Seed to be drilled in 9″ rows.

Plant protection chemicals

1.	Mercuric compound 2·5% W. P.	16	gm.
2.	Streptocycline	24·16	gm.
3.	Copper sulphate	24·16	gm.
4.	Carbofuran 75% W. P.	498	gm.
5.	Parathion 50% E. C.	474	ml.
	or		
	Endrin 20% E. C.	1·185	lit.
	or		
	Dimethoate 30% E. C.	790	ml.
	or		
	Phosphomedon 100% E. C.	507	ml.
	or		
	Phorate granules 10 % G.	9·750	kg.
	or		
	Carbofuran granules 5% G.	15	kg.
6.	Hinosan	744	ml
	or		
	Kasumin	744	gm.
	or		
	Zineb	1·354	kg
7.	Malathion 5%	8	kg.

NURSERY

Raise nursery in about 3 guntas to provide seedlings for one acre. Prepare 30 seed beds of 25 feet long, 4 feet wide and 4 inches high. Apply 2 to 3 baskets of farm yard manure or compost along with 3/4 kg. Ammonium Sulphate, 3/4 kg. Super Phosphate and 3/4 kg. Muriate of Potash perbed.

TRANSPLANTING

Use seedlings of 20 to 25 days old for transplanting. Apply 50 % N and the entire dose of P_2O_5 and K_2O before transplanting. Transplant seedlings in 8″ rows at 4″ apart with 2-3 seedlings per hill in a depth not exceeding 1½″

In case of Jaya, IR-8 and IR-20, topdress the crop with 25% N, 4 weeks after transplanting and 25% N at panicle initiation stage.

In case of Suma and Jenugudu, apply 7½ kg N, 4 weeks after transplanting and 5 kg N, at panicle initiation stage.

IRRIGATION AND INTERCULTURE

Limit the level of water in the plots to 1″ during the first ten days and increase the water level to 2″ during the rest of the growing period.

Pass the weeder four times at two, seven, nine and twelve weeks after transplanting.

PLANT PROTECTION

Important insect pests and diseases of the crop.

Insects: Mealy bug, Thrips, Plant Hoppers, Gall fly, Stem borer, Leaf roller, Whorl maggot, Case worm, Grass hopper, Swarming caterpillar, Leptispa, Hispa and Gundibug.

Diseases: Blast, Helminthosporium, Bacterial Blight, Udubatti and False smut.

Schedule

1. Seed treatment : Soak the seed in Mercuric compound, Streptocycline and copper sulphate solution (8 gms of mercuric compound +1·75 gm of Streptocycline+1·75 gm of copper sulphate dissolved in 18 litres of water) for 20 minutes. Remove the seed and treat with Carbofuran 75% W. P. at the rate of 3·5 gm per kg. seed. Remove and dry in shade. In case of wet nursery, seeds are to be treated with Carbofuran before sprouting. (36 lities of solution is required to treat the seed.)

2. In the absence of seed treatment with Carbofuran, spray the nursery of 10–12 days old with 18 ml Parathion or 45 ml Endrin or 9 ml Phosphomedon or 30 ml Dimethoate with 18 ml Hinosan or 18 gm. Kasumin or 40 gm. Zineb and 0·5 gm. Steptocycline and 0·5 gm Copper Sulphate in 18 litres of water. 18 litres of spray mixture is required for spraying.

3. Repeat the same spray just a day before transplanting. 36 litres of spray mixture is required for this purpose.

   OR

   In place of insecticide, apply Phorate at 750 gm per 3 guntas nursery before sowing, if seed treatment with Carbofuran is not done.

   In place of item 3 above instead of spraying insecticide, soak the seedlings over night with Carbofuran solution prepared at the rate of 3 gm. per. litre of water. 200 litres of solution is required to treat seedlings sufficient for one acre. Only the root zones are to be soaked after washing roots.

4. Repeat the same spray mentioned in item No. 2 above 20 to 25 days after transplanting or broadcast 4·5 kg Phorate granules or 7·5 kg Carbofuran granules in place of insecticide. Use 130 to 150 litres of spray mixture per acre.

5. Repeat the same spray as in item 2 above after 45 to 50 days. Use about 200–270 litres of spray mixture per acre. Or in place of insecticide, apply 7·5 kg Carbofuran granules or 4·5 kg Phorate granules after 45 to 50 days after transplanting.

6. Spray the crop at flag leaf stage with 18 ml Hinosan or 18 gm. Kasumin or 40 gm. Zineb and 0·5 gm. Streptocycline and 0·5 gm Copper sulphate with 9 ml Phosphomedon in 18 litres of water. Use about 270 litres of spray mixture per acre.

7. Spray the crop again with 18 ml Hinosan or 18 gm Kasumin or 40 gm Zineb with 9 ml. phosphomedon in 18 litres of water 12 days after flowering. Use about 270 litres of spray mixture per acre. In place of phosphomedon dust Malathion 5% at the rate of 8 kg per acre.

NOTE

1. Streptocycline is not necessary in case of Jenugudu and IR-20.
2. Hands must be dried and free from wounds while handling Carbofuran.
3. Water should be drained out just before the application of granular insecticides to the field. Impounding of water should be done 24 hours after the application.

WEED CONTROL

Spray 2-4D, at 1 kg per acre in 270 – 360 litres of water, 3-4 weeks after transplanting and again before the sixth week as post-emergent spray on weeds. Dicot weeds and some annual grasses and sedges are controlled. Avoid spray drift reaching other susceptible crops like cotton, grapes, legumes, potatoes, and cucurbits if any in the viscinity

OR

Spray Propanil 3-litre per acre in 270–360 litres of water as post-emergent spray when weeds are young and in 1-2 leaf stage. Dicot and Monocot weeds are controlled. Drain the field 24 hours before spraying and let in water 24 to 48 hours after the spray. Do not mix propanil with other chemicals. This is also recommended for drill sown paddy 4 weeks after sowing.

YIELD

About 25–30 quintals grain can be expected from one acre of IR-8, IR-20 or Jaya and 18 to 20 quintals from Jenugudu or Suma.

HYBRID JOWAR–IRRIGATED

The two important Hybrid Jowar varieties in use are CSH–1 and CSH–2. The variety CSH–1 takes 100 to 105 days to mature and CSH–2 takes 110 to 120 days.

IMPORTANT FEATURES

CSH–1: The plants grow to a height of 4½ feet. The grains are bold and light yellow in colour.

CSH–2: This grows to a height of 5 to 6½ feet. The earheads are big. The grains are bold, white and hard.

* High yields are possible only with the application of adequate doses of fertilizers.

* Since these hybrids are susceptible to many pests, systematic plant protection is necessary, otherwise the whole crop may be lost.

* Since the plants will be green even at the time of harvest, the stalks will form better fodder.

SEASON

The best season for sowing is from middle of February to end of June. But in TBP area, sowing may be done from middle of January to end of June.

AREA

CSH–1 is recommended for all Jowar growing areas of the State both in monsoon and summer. CSH–2 is recommended to the transition belt of Belgaum and Dharwar districts.

INPUTS PER ACRE

Seed: 4 kg certified seed.

Organic manure: Farm yard manure or Compost.: 2500 to 3000 kg.

Fertilizers: 50 kg. N, 30 kg P_2O_5 and 15 kg K_2O

Plant protection chemicals

1.	Phorate granules 10%	16 kg.
	or	
	Disulfoton granules	16 kg.
	or	
	Carbofuran 75% W. P.	320 gm
2.	Endrin 20% E. C.	1·125 lit.
	or	
	Endrin granules 2%	21 kg.
	or	
	Lindane granules 1%	18 kg.
3.	Carbaryl 50% W. P.	3·45 kg.
	or	
	Malathion 50% E. C.	1·080 lit.
	or	
	Malathion 5% dust	16 kg.
	or	
	Carbaryl 10% dust	16 kg.
4.	Zineb	2·200 kg.
5.	Parathion 50% E. C.	180 ml.

SOWING

Sow the crop in 15″ rows at 4″ apart not deeper than 1½ inches. Apply 20 kg. N, 30 kg. P_2O_5 and 15 kg K_2O before sowing. Top dress the crop with 30 kg. N four weeks after sowing.

IRRIGATION AND INTERCULTURE

Irrigate the crop once in 8 days in case of sandy loam soils and once in 15 days in case of heavy soils depending upon weather conditions. Critical periods are, germination, growing period, flag leaf stage and grain formation.

Remove the side shoots within 30 days after sowing, without fail. Earth up the crop after top-dressing.

PLANT PROTECTION

Important insect pests and diseases of the crop

Insects: Shootfly, Deccan wingless grass hoopper. Stem borer, Bug, Aphids Mites, Earhead midge, Webbing caterpillar, Plant hopper, Flea beetle and Army worm.

Diseases: Rust, Leaf spot, Sugary disease and Downey mildew.

Schedule

1. Use certified seeds.

2. The crop sown from middle of February to end of June in Northern districts of the State may escape the attack of shootfly. The crop sown between July and February should be protected as follows. Apply 10% Phorate or Disulfoton ganules at 16 kg. per acre in furrows before planting.
   Caution: Avoid direct contact of the seed with the chemical.

   OR

   Seed treatment: Moist 4 kg. seed with 120 ml of 2% Methyl cellulose solution. Add a small quantity of water and thoroughly mix with 320 gm corbofuran 75% W. P. and dry in shade. Seed treatment should be done on the day of sowing.

3. Spray the crop with 45 ml. Endrin and 40 gm. Zineb in 18 litres of water after 15 days, and 30 days after sowing. Use 150 litres of spary mixture for everv spray. These sprays help in controlling the stem borer and some diseases.

   OR

   In place of insecticide, drop 7 kg. Endrin 2 % granules or 6 kg. Lindane 1% granules into the whorls of leaves 15 days, 30 days and 45 days after sowing. Also spray Zineb at 40 gm. in 18 litres of water.

4. Spray the crop with 18 ml. Parathion in 18 litres of water if the attack of mites is noticed. Use about 180 litres of spray mixture per acre.

5. If the earhead bug or midge is noticed, spray the crop with 115 gm. Carbaryl or 36 ml. Malathion with 40 gm. Zineb in 18 litres of water. Use about 270 litres of spray mixture per acre.

6. Repeat the same spray if the pest persists, 15 days after the previous spray.

   OR

   In place of insecticides in items 5 and 6, dust the earheads with 8 kg. Malathion 5% dust or 8 kg. Carbaryl 10% dust, when the earhead bug or midge is noticed. Repeat the same dusting 15 days after the first dusting. Besides, spray the crop with Zineb at 40 gm. in 18 litres of water.

WEED CONTROL

Spray the soil the same day or one day after sowing jowar, with Atrazine at 300 to 400 gm. per acre in 270-360 litres of water. At the time of spray, the soil should be in fine tilth and there should also be sufficient moisture in the soil. Do not exceed the dosage. High dosage of Atrazine affect germination adversely.

YIELD

20-25 quintals grain and 4-5 tons fodder can be expected per acre.

RATOON CROP

Hybrid Jowar lends itself for ratooning under irrigation. Ratoon crop will be ready in about 80 days.

Harvest all earheads and also cut the stalks on the same day if possible. This ensures uniform sprouting. Irrigate the crop immediately after harvest.

An application of 40 kg.N, 20 kg. P_2O_5 and 20 kg. K_2O is to be given 3-4 weeks after the harvest of main crop.

Ordinarily rotoon crop will yield 15 to 20 quintals grain and 4 to 5 tons fodder per acre.

Note: If sugary disease is noticed spray 50 gm. Ziram in 18 litres of water.

HYBRID JOWAR – RAINFED

Hybrid Jowar can also be grown as a rainfed crop under normal conditions of rainfall. Both the varieties CSH-1 and CSH-2 can be grown.

SEASON

* Southern region: April to May

* Northern region: May to June

AREA

* CSH-1: All Jowar growing areas of the State.

* CSH-2: Transition belt of Belgaum and Dharwar districts.

INPUTS PER ACRE

Seed: 3 to 4 kg. certified seed.

Organic manure: Farm yard manure or Compost : 1000 to 1500 kg.

Fertilizers	N	P_2O_5	K_2O
For transition belt of Belgaum and Dharwar	40 kg.	30 kg.	15 kg.
For other areas of the State	25 kg.	15 kg.	10 kg.

Plant Protection chemicals

1. Phorate granules 10%	16 kg.
or	
Disulfoton granules	16 kg.
or	
Carbofuran 75% W. P.	320 gm.
2. Endrin 20% E. C.	1·125 lit.
or	
Endrin granules 2%	21 kg.
or	
Lindane granules 1%	18 kg.
3. Carbaryl 50% W. P.	3·45 kg.
or	
Malathion 50% E. C.	1·080 lit.
or	
Malathion 5% dust	16 kg.
or	
Carbaryl 10% dust	16 kg.
4. Zineb	2·200 kg.
5. Parathion 50% E. C.	180 ml.

SOWING

Transition area: Sow the crop in 15″ rows at 4″ apart not deeper than 1½″. Apply 25 kg N, 30 kg. P_2O_5 and 15 kg. K_2O before sowing. Top dress the crop with 15 kg. N, 30 days after sowing.

Other areas of the State: Sow the crop in 15″ rows at 4″ apart. Apply the entire dose of fertilizers before sowing.

Follow the same plant protection measures suggested for the irrigated crop.

WEED CONTROL

Follow the same weed control measures suggested for irrigated crop.

YIELD

8 to 12 quintals grain and 2–3 tons fodder can be expected from one acre.

Note:—If sugary disease is noticed, spray 40 gm Ziram in 18 litres of water.

HYBRID MAIZE—IRRIGATED

Hybrid Maize has become one of the important food crops of the State. Variety 'Deccan' is best suited for the State. The crop takes 110 to 120 days to mature. Alkaline, marshy and ill-drained soils are not suitable for this crop.

SEASON

This crop can be grown throughout the year. But the best months for sowing the crop are, June-July, September-October and January–February. Winter months are not suitable for this crop. The crop does not do well at temperatures of 105°F, and above, since high temperatures results in poor pollination.

INPUTS PER ACRE

Seed: 6 Kg. certified seed.

Organic manure: Farm yard manure or Compost: 2500 to 3000 Kg.

Fertilizers: 60 Kg. N, 30 kg. P_2O_5 and 15 kg. K_2O.

(*Note:* Fertilizer recommendations should be based on soil tests wherever possible).

Plant Protection Chemicals

1.	Endrin 20% E.C.	.. 1·485 lit.
	or	
	Phosphomedon 100% E.C.	.. 297 ml.
	or	
	Dimethoate 30% E.C.	.. 990 ml.
	or	
	Endrin granules 2%	.. 18 kg.
2.	Carbaryl 50% W.P.	.. 920 gm.
3.	Zineb	.. 1·32 kg.

SOWING

Sow the seed in 24″ furrows at 12″ apart not deeper than 2″. Apply 20 kg. N, 30 kg. P_2O_5 and 15 K_2O before sowing. Top dress the crop with 40 kg. N, 3 to 4 weeks after sowing. Placement of fertilizer in the form of a band about 3″ to 4″ away from the plant, is always the best.

IRRIGATION AND INTERCULTURE

Irrigate the crop once in 8 days in case of sandy loam soils and once in 15 days in heavy soils depending upon the weather. Critical periods are, germination, tasseling and grain formation.

Earth up the crop after top dressing when the crop is 25 to 30 days old. Keep the land free from weeds.

PLANT PROTECTION

Important insect pests and diseases of the crop

Insects: Stem borer, Pink borer, Cob-worm and Aphid.

Diseases: Downy mildew, Rust and Leaf blight

Schedule

1. Use certified seeds
2. Spray the crop of 15 days old with 40 gm. Zineb and 45 ml. Endrin or 9 ml Phosphomedon or 30 ml Dimethoate in 18 litres of water. Use about 200 litres of spray mixture per acre.
3. Repeat the same spray 30 days and again 45 days after sowing.

   OR

   In place of insecticides mentioned in item 2 and 3 above drop 6 Kg Endrin granules every time into the whorls of leaves at 15 days, 30 days and 45 days after sowing. Besides, spray the crop with Zineb at 40 gm. in 18 litres of water.
4. Spray the cobs with 115 gm Carbaryl in 18 litres of water. Use about 150 litres of spray mixture per acre.

WEED CONTROL

Spray the soil on the same day or one day after sowing maize, with Simazine at 1·00 kg in case of light soils and 1½ kg in heavy soils in 270–360 litres of water. The soil should be in fine tilth at the time of spray and there should be sufficient moisture in the soil. Almost all weeds propagated by seeds are killed.

YIELD

The crop will be ready for harvest in 110 to 120 days. 20–25 quintals grain and 10 tons fodder can be expected from one acre.

Caution: Avoid sowing in September in places where previous infestation of Downy mildew is noticed.

HYBRID MAIZE–RAINFED

Hybrid Maize can also be grown as a dry crop in transitional areas of the State. There are instances where farmers around Bangalore have grown good crops of Hybrid Maize in dryland.

Variety 'Deccan' is recommended for rainfed crop.

SEASON

The best season for sowing is from May to July.

INPUTS PER ACRE

Seeds 5 kg certified seed.

Organic manure: Farm yard manure or Compost: 2,500 kg to 3000 kg.

Fertilizers: 35 kg. N, 20 kg. P_2O_5 and 10 kg. K_2O.

Note: Fertilizer recommendations should be based on soil tests wherever possible.

SOWING

Sow the seed in 30″ furrows at 12″ apart and not deeper than 2″. Generally the entire fertilizer should be given before sowing. But, in the case of sandy soils 20 kg. N, 20 kg. P_2O_5 and 10 kg. K_2O is to be given at the time of sowing. Remaining 15 kgs N be given 25 to 30 days after sowing when sufficient moisture is available in the soil.

Follow other cultivation practices as suggested for the irrigated crop.

Plant protection

undertake spraying or dusting if found necessary as suggested in the case of irrigated Maize.

Weed control

Follow the same measures suggested for irrigated crop.

YIELD

The crop will be ready for harvest in 110 to 120 days. About 10-12 quintals grain and 5 to 6 tons fodder can be expected from one acre.

RAGI–IRRIGATED

Ragi is mostly a rainfed crop of the State. Higher yields are obtained only under irrigated conditions. There are some important irrigated ragi varieties. Out of these Purna is a high yielder. The crop takes 105 to 115 days to mature. Purna is recommended for the entire State.

SEASON

The crop can be sown throughout the year except the period between October and middle of January.

INPUTS PER ACRE

Seeds: 2 to 2·5 kg.

Organic manure: Compost or Farm yard manure : 3000 kg.

Fertilizers: 40 kg N, 20 kg. P_2O_5 and 20 kg K_2O.

Note: (i) Fertilizer recommendations should be based on soil tests wherever possible.

(ii) This is exclusive of the fertilizers required for nursery.

Plant protection chemicals

1.	Mercuric compound 1%	.. 5 gm.
2.	Parathion 50% E. C.	.. 485 ml.
	or	
	Endrin 20 % E. C.	.. 1·215 lit.
	or	
	Phosphomedon 100% E. C.	.. 243 ml
	or	
	Dimethoate 30% E. C.	.. 810 ml.
3.	Hinosan	.. 1 litre
	or	
	Zineb	.. 2 kg.
	or	
	Kasumin	.. 1 kg.
4.	Heptachlor 6%	18 kg.
	or	
	Aldrin 5%	.. 20 kg.
	or	
	Chlordane 5%	.. 20 kg.

5. Phorate 10% granules	..	10 kg.
6. Malathion 50% E. C.	..	500 ml.
or		
Carbaryl 50 % W. P.	..	1·6 kg.
Other chemicals		
Zinc Sulphate	..	12·5 gm.

Seed treatment with Zinc

Prepare a paste of 12·5 gm Zinc Sulphate with 5-6 table spoon full of water in an earthern or plastic container. Mix 2 to 2½ kg seed ragi and keep it over night and sow on the next day.

NURSERY

Raise nursery in about 1½ guntas. Prepare 15 raised seed beds of 25″ long. 4″ wide and 4″ high. Apply 3-4 baskets of farm yard manure, ½ kg. Ammonium Sulphate, ¼ kg Superphosphate and ¼ k.g. Muriate of Potash for each bed and mix them well in the soil. Divide 2 to 2½ kg seeds equally to 15 beds and sow in 3 inch rows. Cover the seed with fine dry earth or farm yard manure. Water the seed beds every evening. Top dress the seedlings after 12 days with ¼ kg to ½ kg Ammonium Sulphate per bed. The seedlings will be ready for transplanting in about 20 days.

TRANSPLANTING

Apply 20 kg N, 20 kg. P_2O_5 and 20 kg. K_2O and mix them well in the soil. Transplant seedlings of about 20 days old in 9″ rows at 3″ apart with 2-3 seedlings per hill. Top dress the crop with 20 kg. N, 20 days after transplanting.

IRRIGATION AND INTERCULTURE

Irrigate the crop once in 8 days in case of sandy soils and once in 15 days in case of heavy soils depending upon weather. The critical stages are, —tillering, flowering and grain formation.

Pass two tyned harrow between the rows, 17 days and 25 days after transplanting. Keep the field free from weeds.

PLANT PROTECTION

Important insect pests and diseases of the crop.

Insects: Root grub, Stem borer, Redheaded hairy caterpillar, Leaf hopper, Black headed hairy caterpillar, webbing catterpillar, Cut worm and Aphid.

Diseases: Foot rot, seedling blight, Virus, Helminthosporium and Blast.

Schedule

1. Treat the seed with Mercuric compound at 2 gm. per kg. seed and then treat with Zinc as given under item seed treatment with Zinc.
2. Spray the nursery of 15 days old with 18 ml. Parathion or 9 ml. Phosphomedon or 30 ml. Dimethoate with 18 ml. Hinosan or 18 gm. Kasumin or 40 gm. Zineb in 18 litres of water.
3. Apply 10 kg. Phorate granules or 20 kg. Aldrin or 20 kg. Chlordane or 18 kg. Heptachlor to the soil before planting. This is required only in areas of previous infestation with Termites. Phorate can control Root grubs as well as Termites.
4. Repeat the spray mentioned in 2 above 20 days after transplanting. Use about 200 litres of spray mixture per acre.
5. Give the third spray 35 to 40 days after transplanting. Use about 250 litres of spray mixture per acre.
6. Give a fourth spary at milk stage with 18 ml. Hinosan or 18 gm. Kasumin or 40 gm. Zineb and 36 ml. Malathion or 115 gm. Carbaryl in 18 litres of water. Use about 250 litres of spray mixture per acre.
7. Give the last spray with 18 ml. Hinosan or 40 gm. Zineb or 18 gm. Kasumin in 18 litres of water, 12 days after the fourth spray. Use about 250 litres of spray mixture per acre.

YIELD

The crop will be ready for harvest in 80 to 90 days after transplanting and 15 to 20 quintals grain can be expected per acre.

RAGI—RAINFED

Ragi is one of the important rainfed crops of the southern districts of the State. This crop is being grown in about 22 lakh acres every year.

VARIETIES AND DURATION

1. Cauvery	.. 125 to 130 days
2. H-22	.. 140 to 150 days
3. E. S. 11	.. 110 to 120 days
4. Purna	.. 105 to 115 days

AREA

Cauvery, H-22, ES-11 and Purna are recommended for all the Ragi growing areas except Mysore, Hassan and Coorg Districts.

Purna is also recommended for kar tracts of Mysore, Hassan and Coorg districts.

SEASON

Cauvery and H-22 are recommended for June-July sowings. E. S. 11 and Purna are recommended for late sowing.

INPUTS PER ACRE

Seed :	Broadcasting	5 kg.
	Drill sowing	4 kg.
	Transplanting	2 to 2·5 kg.

Organic manure: Farmyard manure or Compost. 3000 kg.

Fertilizers: 20 kg N, 20 kg. P_2O_5 and 10 kg. K_2O.

Note: Fertilizer recommendations should be based on soil tests wherever possible.

Plant protection chemicals

1. Mercuric compound 1%	.. 4 to 10 gm.
2. Heptachlor 6%	.. 18 kg.
or	
Aldrin 5%	.. 20 kg.
or	
Chlordane 5%	.. 20 kg.
3. Parathion 50% E. C.	.. 485 ml.
or	
Endrin 20% E. C.	.. 1215 ml.
or	
Phosphomedon 100% E. C.	.. 243 ml.
or	
Dimethoate 30% E. C.	.. 810 ml.
4. Hinosan	.. 1 litre
or	
Zineb	.. 2 kg.
or	
Kasumin	.. 1 kg.

SOWING

Seed hardening : Soak seed ragi in water for about 18 hours. Use 600 ml. water for soaking every kg. seed. (start soaking in the evening. By next morning the first sign of germination will be visible). Remove the seed and dry in the shade for 24 hours. Then, treat with fungicide and use treated seed within 10 days for sowing. Normally crop is sown using a seed drill of 9". But in some parts of the State broadcasting is still in practice. Drilling is preferable. In the case of transplanting, seedlings of about 20 days old are transplanted in 9" rows at 3" apart with 2–3 seedlings per hill. The entire dose of fertilizers be given before sowing or transplanting.

The other cultural practices are similar to that of irrigated crop. Plant protection is to be undertaken whenever necessary as indicated for irrigated crop.

YIELD

The crop will be ready for harvest in about 105 to 150 days depending upon the variety. About 8 quintals grain can be expected from one acre.

WHEAT—IRRIGATED

Wheat is an important grain crop in the northern parts of the State. This is being grown in about 6 lakh acres every year. Some of the important Mexican varieties of wheat have become popular in the State. Out of these Lerma Rojo, Safed Lerma, Choti Lerma and UP 301 are recommended for the State.

IMPORTANT FEATURES

- * The crop will be ready for harvest in about 105 to 110 days
- * They are dwarf
- * They are non-lodging
- * They respond to high levels of fertilizers
- * They are tolerent to certain types of rust
- * UP 301 is suitable for bakery products

SEASON

The best season for sowing is from middle of October to middle of November.

INPUTS PER ACRE

Seed: 50 to 60 kg.
Organic manure: Compost or Farmyard manure. 2500 to 3000 kg.
Fertilizers: 60 kg. N, 40 kg. P_2O_5 and 30 kg. K_2O.

Note: Fertilizer recommendations should be based on soil tests. wherever possible.

Plant protection chemicals

1. Mercuric compound 1%	.. 120 gm.
2. Heptachlor 6%	.. 18 kg.
or	
Chlordane 5%	.. 20 kg.
or	
Aldrin 5%	20 kg.
3. Endrin 20% E. C.	.. 1.305 lit.
or	
Phosphomedon 100% E. C.	.. 261 ml.
or	
Dimethoate 30% E. C.	.. 870 ml.
4. Zineb	.. 1·160 kg.

SOWING

After the land is ready, apply 30 kg. N, 40 kg. P_2O_5 and 30 kg. K_2O. Sow the seed in 7″ rows not deeper than 2″. Top dress the crop with the remaining 30 kg. N, 30 days after sowing.

IRRIGATION AND INTERCULTURE

Irrigate the crop once in 8 to 10 days in case of sandy loam soils and once in 15 days in case of heavy soils. The critical periods are: tillering (20 to 25 days after sowing) flowering and grain formation. Keep the field free from weeds.

PLANT PROTECTION

Important insect pests and diseases of the crop

Insects: Termites, Stem borer, Stink bug and Aphid.

Diseases: Rust, Foot rot, Leaf blight and Loose smut.

Schedule

1. Treat the seed with Mercuric compound 1%. Use 2 gm. for every kg. seed.
2. Incorporate 20 kg. Aldrin or 20 kg. Chlordane or 18 kg. of Heptachlor dust into the soil.
3. Spray the crop with 40 gm. Zineb and 45 ml. Endrin or 9 ml. Phosphomedon or 30 ml. Dimethoate in 18 litres of water, 20 days after sowing.
4. Repeat the same spray 30 days after the first spray. Use 180 to 230 litres of spray mixture per acre.
5. Remove and destroy all the earheads affected by smut.

YIELD

The crop will be ready for harvest in about 105 to 110 days. About 10–15 quintals grain can be expected per acre.

WHEAT—RAINFED

Wheat is mostly a rainfed crop in northern parts of the State. Bijaga Yellow and Lerma Rojo are the two important varieties recommended for dry cultivation. Bijaga Yellow takes about 110 to 115 days to mature. But Lerma Rojo can be harvested in 105 to 110 days. Bijaga Yellow is a local improved variety.

SEASON

The best season for sowing is the second week of October.

AREA

Bijaga Yellow and Lerma Rojo are suitable for all the black cotton soil areas of the State. Lerma Rojo can be grown even in other areas of assured rainfall.

INPUTS PER ACRE

Seed: 30 kg.

Organic manure: Farmyard manure or Compost. 2500 kg.

Fertilizers: 20 kg. N and 10 kg. P_2O_5

Plant protection chemicals

1.	Mercuric compound 1%	.. 60 gm.
2.	Heptachlor 6%	.. 18 kg.
	or	
	Aldrin 5%	.. 20 kg.
	or	
	Chlordane 5%	.. 20 kg.
3.	Endrin 20% E. C.	.. 1·305 lit
	or	
	Phosphomedon 100% E. C.	.. 261 ml.
	or	
	Dimethoate 30% E. C.	.. 870 ml.
4.	Zineb	.. 1·160 kg.

SOWING

Use the entire quantity of fertilizers before sowing. Sow the seed in 9″ rows.

Follow similar cultural practices and plant protection measures suggested for the irrigated crop.

YIELD

The crop will be ready for harvest in 105 to 115 days depending upon the variety. About 5 quintals grain can be expected from one acre.

HYBRID BAJRA—IRRIGATED

Bajra is another important food crop in low rain fall areas of the State. The crop is being grown in about 10 lakh acres every year. HB-1 and HB-4 are the varieties recommended for the State.

IMPORTANT FEATURES

- * Non-lodging.
- * The plant tillers profusely and bears uniform earheads.
- * Responds well to high levels of fertilizers.
- * Crop matures in 80 to 85 days.

SEASON

Summer crop should be sown in January and monsoon crop before 15th July.

INPUTS PER ACRE

Seed: 2 kg. certified seed.

Organic manure: Farmyard manure or Compost. 2,500 kg.

Fertilizers: 40 kg. N, 25 kg. P_2O_5 and 10 kg. K_2O.

Note: This is exclusive of the fertilizers required for nursery.

Plant protection chemicals

1. Aldrin 5%	.. 20 kg.
or	
Chlordane 5%	.. 20 kg.
or	
Heptachlor 6%	.. 18 kg.
2. Zineb	.. 1 kg.
3. Ziram	.. 500 gm.
4. Malathion 5% dust	.. 8 kg.

NURSERY

Prepare 12 raised seed beds of 25′ long 4′ wide and 4″ high to raise seedlings for one acre. Apply 3-4 baskets of Farmyard manure or Compost per bed. Also add ½ kg. Ammonium Sulphate, ¼ kg. Super phosphate and ½ kg. Muriate of Potash for each bed and mix them well in the soil. Divide 2 kg. seed for all 12 beds and sow in 3 inch rows. Cover the seed beds with dry earth or Farmyard manure. Water the beds every day. Seedling will be ready for transplanting in about 20 days.

TRANSPLANTING

After the land is ready, apply 20 kg. N, 25 kg. P_2O_5 and 10 kg. K_2O before transplanting. Transplant seedlings of about 20 days old in 18″ rows at 6″ apart with 2-3 seedlings per hill. Top dress the crop with the remaining 20 kg N, 25 days after transplanting.

IRRIGATION AND INTERCULTURE

Irrigate the crop once in 8 days in case of sandy loam soils and once in 15 days in heavy soils depending upon weather conditions. Critical periods are: tillering, flowering and grain formation. Earth up the crop after top dressing. Keep the land free from weeds.

PLANT PROTECTION

Important insect pests and diseases of the crop

Insects: Termites, Blister beetle and Sucking bug.

Diseases: Ergot, leaf rust and Green ear or Downy mildew.

Schedule

1. Use certified seeds.
2. Apply 20 kg. Aldrin or 20 kg. Chlordane or 18 kg. Heptachlor to the soil before transplanting.

   Note: This is to be applied only when previous infestation of Termites or Root grubs is noticed. This treatment is expensive but control lasts for three years.

3. Spray 40 gm. Zineb in 18 litres of water about 20 days after transplanting. Use about 180 litres of spray mixture per acre.

AFO-040

4. Repeat the same spray about 35 days after transplanting. Use about 200 litres of spray mixture per acre.
5. Spray the crop again with 40 gm. Ziram in 18 litres of water when 75% of earheads emerge. Use about 200 litres of spray mixture per acre.
6. Dust 8 kg. Malathion dust per acre at the stage of grain formation.

YIELD

The crop will be ready for harvest in 80 to 85 days. About 12–15 quintals grain and two tons fodder can be expected from one acre.

HYBRID BAJRA—RAINFED

Bajra is mostly a rainfed crop in northern districts of the State. The average yield from local varieties is only about 2 quintals per acre. It is possible to get higher yields from new hybrid varieties. HB-3 is the variety suitable for dryland. This variety is recommended to all Bajra growing areas of the State.

SEASON

The best season for sowing the crop is from 1st June to 15th July.

INPUTS PER ACRE

Seed: 2 kg. certified seed.

Organic manure: Farmyard manure or Compost. 2,500 kg.

Fertilizers: 20 kg. N, and 10 kg. P_2O_5.

Plant protection chemicals

1.	Aldrin 5%	.. 20 kg.
	or	
	Chlordane 5%	.. 20 kg.
	or	
	Heptachlor 6%	.. 18 kg.
2.	Zineb	.. 1 kg.
3.	Ziram	.. 500 gm.

SOWING

Apply the entire quantity of fertilizers before sowing. Sow the seed in 18" rows at 6" apart.

Follow the same cultural practices and plant protection measures suggested for irrigated crop.

YIELD

The crop will be ready in 80 to 85 days. About 4 to 6 quintals grain and 1 to 1½ tons fodder can be expected from one acre.

COTTON – IRRIGATED

Cotton is an important fibre crop of the State. The crop is being grown in about 25 lakh acres every year. It is mostly grown as a rainfed crop in northern parts of the State. Higher yields can be obtained only under irrigation.

Varieties	*Duration*	*Season*
* Mysore Vijaya	210 days	May 15 to June 15
* Hampi	190 days	Middle of August
* 170 CO-2	250 days	April 15 to May 15
* Virnar	150 days	Middle of April

AREA

Mysore Vijaya and 170 CO-2 are recommended to Ghataprabha area. Hampi is suitable to TBP, Bhadra Project and all the irrigated cotton growing areas of the State. Virnar is recommended to Bijapur area.

INPUTS PER ACRE

Seed : (All varieties except virnar)	.. 3 kg
Virnar	.. 5 kg.

Organic manure: Farmyard manure or Compost. 2,500 to 3,000 kg.

Fertilizers: 30 kg. N, 15 kg. P_2O_5 and 15 kg. K_2O.

Plant protection chemicals

1.	Mercuric Compound 1%	.. 7·5 gm.
2.	Endrin 20% E. C.	.. 6·5 lit.
	and Wettable Sulpher	.. 14 kg.
	or	
	Oxydemeton-Methyl 25% E. C.	.. 500 ml.
	or	
	Phosphomedon 100% E. C.	.. 200 ml.
	or	
	Dimethoate 30 % E. C.	.. 700 ml.
	or	
	Parathion 50% E.C.	.. 500 ml.
3.	Carbaryl 50% W. P.	.. 13·5 kg.
	+Wettable Sulphur	.. 12·5 kg.
	or	
	Carbaryl 10% dust.	.. 45 kg.
	+Sulphur dust (300 mesh)	.. 15 kg.

SOWING

Apply 15 kg. N, 15 Kg. P_2O_5 and 15 kg. K_2O just before sowing. Sow the seed of all the varieties except Virnar in 2½′ rows at 12″ apart. Virnar variety is to be sown in 15″ rows at 9″ apart. It is always advisable to place the fertilizers 2″ below the seed line. Top dress the crop with 15 kg. N. 60 days after sowing.

IRRIGATION

Irrigate the crop once in 8 days in case of sandy loam soils and once in 15 days in heavy soils depending upon the weather conditions.

PLANT PROTECTION

Important insect pests and diseases of the crop.

Insects: Spotted bollworm, Pink bollworm, Aphid, Jassid, Thrips, Mites, Heliothis, Leaf roller, Meally bug, Red cotton bug and Dusky cotton bug.

Diseases: Blackarm and Leaf spot.

Schedule

1. Treat the seed with mercuric compound 1% at 1·5 gm. per kg. seed.

2. Spray the crop of 15 days old with 45 ml. Endrin + 100 gm. wettable sulphur or 22 ml. oxydemeton-methyl or 9 ml. phosphomedon or 30 ml. Dimethoate or 18 ml. Parathion in 18 litres of water. Use about 100 litres of Spray mixture per acre.

3. Repeat the spray mentioned in item 2 above, on the 25th day and 35th day after sowing. use 150 litres and 180 litres of spray mixture per acre for the above sprays respectively.

4. 50 days after sowing, spray the crop again with 45 ml. Endrin and 100 gm. wettable sulphur or 115 gm. Carbaryl W. P. + 100 gm. wettable sulphur in 18 litres of water. Use 250 litres of spray mixture per acre.

5. Repeat the spray mentioned in item 4 above on 65th day, 80th day, 95th day, 110th day and 125th day. use 300, 325, 375, 400 and 400 litres of spray mixtures per acre for the above sprays respectively.

or

Dust the crop with Carbaryl dust+ Sulphur dust (3:1) *i.e.,* 12 kg. (9 kg. Carbaryl dust + 3 kg. Sulphur dust) on 65th day. Repeat the same treatment on 80th day, 95th day, 110th day and 125th day.

WEED CONTROL

Spray the soil the same day or a day after sowing with 400-500 gm. Diuron per acre in 270 to 360 litres of water. The soil should be in fine tilth at the time of spray and there should also be sufficient moisture in the soil. Give a light irrigation after spray. All weeds propagated by seeds are killed.

YIELD

About 6 to 8 quintals yield may be expected per acre.

COTTON – RAINFED

Cotton is grown mostly as a rainfed crop in the Northern districts of the State. There are nine varieties recommended for different parts of the State under rainfed conditions.

Varieties	*Duration*	*Area*
1. Jayadhar (Herbacium)	200-230 days	Transition belt of Dharwar
2. Lakshmi (Hirsutum)	165-200 days	-do-
3. Suyodhar (Herbacium)	200-210 days	Dry Eastern belt of Gulbarga Raichur, Bellary and Bijapur
4. Western-1 (Herbacium)	180-200 days	-do-
5. G-22 (Goarani) (Arborium)	190 days	Bidar area
6. AK-235 (Arborium)	180 days	Chitradurga and Bellary districts.
7. MY-14 (Hirsutum)	190 days	Hassan, Mysore and Shimoga districts.
8. Raichur-51 (Herbacium)	190 days	Raichur district only.
9. Hampi	190 days	Havery, Ranebennur and Byadagi taluks

SEASON

Jayadhar, Lakshmi, Suyodhar, Western-1 and Raichur-51 can be sown between the end of August and end of September. AK-235, G-22 and Lakshmi can be sown in June. MY-14 in April and May and Hampi in middle of August.

INPUTS PER ACRE

Seed: 3 kg.

Organic manure: Farmyard manure or Compost. 2500 to 3000 kg.

Fertilizers: Transition areas: 15 kg. N, 10 kg. P_2O_5 and 15 kg. K_2O.
Scanty rainfall areas: 10 kg. N, 10 kg. P_2O_5 and 5 kg. K_2O.

Note: Fertilizer recommendations should be based on soil tests wherever possible.

Plant protection chemicals

1.	Mercuric compound 1%	.. 7·5 gm.
2.	Endrin 20% E. C.	.. 200 ml.
3.	Wettable sulphur	.. 9 kg.
4.	Oxydemeton methyl 25% E. C.	.. 500 ml.
	or	
	Phosphomedon 100% E. C.	.. 200 ml.
	or	
	Parathion 50% E. C.	.. 500 ml.
	or	
	Dimethoate 30% E. C.	.. 700 ml.
5.	Carbaryl 50% W. P.	.. 8 kg.
	or	
	Carbaryl 10% dust+ Sulphur dust	.. 18 kg + 6 kg

Note: Sulphur should not be used for mites on Herbacium Cotton varieties like Jayadhar, Suyodhar, Western-1 and Arborium varieties like G-22 and AK-235. Use Parathion in place of Sulphur.

SOWING

After the land is ready, sow all the varieties except Hampi the crop in 2′ rows at 12″ apart. Hampi may be sown in 2½′ rows at 12″ apart. Seed cum-fertilizer drill may be used if available. Apply the entire dose of fertilizers at the time of sowing.

PLANT PROTECTION

Important insect pests and diseases of the crop

Insects: Spotted boll worm, Pink bollworm, Aphid, Jassid, Thrips, Mites, Heliothis, Leafroller, Mealy bug, Red cotton bug and Dusky cotton bug.

Diseases: Blackarm and Leafspot.

Schedule

1. Treat the seed with mercuric compound 1% at 1·5 gm. per kg. seed.
2. Spray the crop of 30 days old with 45 ml. Endrin and 100 gm. wettable sulphur or 22 ml. Oxydemeton-methyl or 9 ml. phosphomedon or 30 ml. Dimethoate or 18 ml. parathion in 18 litres of water.
3. Dust the crop with 5 kg. Carbaryl dust with 3 kg. Sulphur dust 50 days after sowing.
4. Repeat the same dusting 90 days after sowing.

WEED CONTROL

Follow the same measures suggested for irrigated cotton.

YIELD

The yield varies from 100 to 250 kg. per acre depending upon the variety and seasonal conditions.

SEA ISLAND COTTON

Sea-Island cotton is mostly grown as a rainfed crop in the districts of Mysore, Coorg, Hassan, Chickmagalur and Shimoga. The annual rainfall in these areas ranges from 35 to 100 inches. This can also be grown as an irrigated crop in Bhadra and Tungabhadra Project areas.

Well drained red loam, sandy loam and gravelly soils are well suited for this crop. This cannot be grown in water logged, saline and alkaline soils. This variety can also be grown in well drained black cotton soils.

SEASON

* TBP area	.. August-September
* Bhadra Project and other areas	.. April–May.

INPUTS PER ACRE

Seed: 4 to 5 kg.

Organic manure: 2,500 kg. Farmyard manure or Compost.

Fertilizers

Rainfed crop: 20 kg. N, 15 kg. P_2O_5 and 30 Kg. K_2O.
Irrigated crop: 40 kg. N, 20 Kg. P_2O_5 and 40 kg. K_2O.

Plant protection chemicals

1.	Mercuric compound 1%	.. 7·5 gm.
2.	Endrin 20 % E. C.	.. 6·5 lit.
3.	Oxydemeton–methyl 24% E. C. or	.. 500 ml lit
	Wettable Sulphur or	.. 12 kg.
	Phosphomedon 100% E. C. or	.. 200 ml
	Parathion 50% E. C. or	.. 500 ml
	Dimethoate	.. 700 ml.
4.	Carbaryl 50% W. P.	.. 13.5 kg.

SOWING

Dry crop: Apply 10 kg. N, 15 kg. P_2O_5 and 30 kg. K_2O before sowing. Dibble 2–3 seeds per hill in $2\frac{1}{2}'$ rows at 12″ apart. It is advisable to place the fertilizers 2″ below the seed line. Top dress the crop with 10 kg. N, 60 days after sowing. Thin out the crop after 3 weeks, retaining two healthy plants per hill.

Irrigated crop: Apply 20 kg. N, 20 kg. P_2O_5 and 40 kg. K_2O before sowing. Dibble 2–3 seeds in 3′ rows and 12″ apart. Top dress the crop with 20 kg. N, 60 days after sowing. It is always advisable to place the fertilizers 2″ below the seed line. Thin out the crop after 3 weeks, retaining two healthy plants per hill.

Irrigate the field one or two days before sowing. Repeat the irrigation after 4–5 days. Regulate subsequent irrigations once in 8 to 10 days depending upon the type of soil and weather conditions.

PLANT PROTECTION AND WEED CONTROL

Follow similar plant protection and weed control measures suggested for irrigated crop.

Note: Last two sprays (after 95 days and 110 days)are not necessary for dry crop.

YIELD

About 300 kg. can be expected from an acre of dry crop. About 600 kg. can be obtained from an acre of irrigated crop.

HYBRID COTTON

Recently two new hybrid cotton varieties have been released for cultivation. They are mostly suitable for irrigated conditions. They yield two times the other improved varieties.

	Varieties	*Duration*	*Sowing season*
1.	Varalaxmi (DCH3)	200 to 220 days	July 15 to August 15
2.	Hybrid-4	180 to 210 days	July 15 to August 15

INPUTS PER ACRE

Seed: 1 kg.

Organic manure: 2500 to 3000 kg. of Farmyard manure or Compost.

Fertilizers: 60 kg. N, 30 kg. P_2O_5 and 30 kg. K_2O.

Note: Fertilizer recommendations should be based on soil tests wherever possible.

Plant protection chemicals

1.	Mercuric compound 1%	.. 1·5 gm.
2.	Endrin 20 E. C.	.. 1 lit
3.	Wettable sulphur	.. 2·5 kg.
4.	Oxydemeton-Methyl 25% E. C.	.. 2·2 lit.
5.	Phosphomedon 100%	.. 900 ml.
6.	Dimethoate 30%	.. 3 lit.
7.	Parathion 30 %	.. 1·8 lit.
8.	Carbaryl 50%	.. 24 kg.
	+Wettable sulphur	.. 24 kg.
	or	
	Carbaryl dust 10%	.. 90 kg.
	+Sulphur dust (300 mesh)	.. 30 kg.

SOWING

Apply 30 kg. N, 30 kg. P_2O_5 and 30 kg. K_5O before sowing. In case of Varalaxmi, dibble seeds in 4′ rows at 2′ apart. Hybrid -4 is to be sown in 4′ rows at 3′ apart. Top dress the crop thrice with 10 kg. N every time at an interval of 30 days starting from 50 days after sowing.

IRRIGATION

Irrigate once in 8 days in case of sandy loam soils and once in 15 days in heavy soils depending upon the weather conditions.

Avoid excessive irrigation particularly at the flowering and boll formation stages. Irrigate the crop till the last picking.

Schedule

1. Treat the seed with Mercuric compound 1% at 1·5 gm. per kg. seed.
2. Spray the crop 15 days after sowing with 45 ml. Endrin and 100 ml. Wettable sulphur or 22 ml. Oxydemeton-Methyl. or 9 ml. Phosphomedan or 30 ml. Dimethoate or 18 ml. Parathion in 18 litres of water. Use 100 litres of spray mixture per acre.
3. Repeat the spray mentioned in 2 above 25 days after sowing. Use 150 litres of spray mixture per acre.
4. Repeat the spray mentioned in item 2 above 35 days after sowing. Use 180 litres of spray mixture per acre.
5. Spray the crop again with 115 gm. Carbaryl WP plus 100 g. of Wettable sulphur in 18 litres of water 45 days after sowing. Use 250 litres of spray mixture per acre.
6. Repeat the spray mentioned above on 55, 65, 75, 85, 95, 105, 115, 125, and 140th day after sowing by using 300, 325, 350, 375, 400, 425, 450, 450, 450 litres of spray mixture respectively.

   or

   Use carbaryl dust+Sulphur dust (300 mesh) in the ratio of 3:1

(9 kg. carbaryl + 3 kg. sulphur dust) per acre.

10 dustings from the 45th day onwards are recommended.

7. On 65th and 85th day, use 40 gm. Zineb in 18 litres of water along with spray recommended in item 2 above.

   This may be done when leaf spot is noticed.

WEED CONTROL

Follow the same weed control measures suggested for Cotton Irrigated.

YIELD

Varalaxmi yields between 12 to 16 quintals and Hybrid-4 between 12 to 15 quintals per acre.

CIGARETTE TOBACCO

It is an early monsoon crop planted during mid may to Mid June. Transplanting is done in Gowribidanur and Mandya areas of the State during April and May.

	Varieties	*Duration*
1.	Virginia Gold	105 to 120 days
2.	Kutsega-51	100 to 110 „
3.	NC-95 (Resistant to nematodes)	100 to 110 „

INPUTS PER ACRE

Seed: 6 to 8 gm.

Organic manure: Farmyard manure 5,000 Kg. to 10,000 Kg.

Fertilizers: 30 Kg. N (preferably in the form of nitrate)
32 Kg. P_2O_5 and 24 Kg. K_2O (in the form of sulphate of potash)

Plant protection chemicals

1.	D. B. C. P. 75% E. C.	250 ml
2.	Captan 75% W. P.	400 gm.
	or	
	Copper Oxychloride	3 Kg.
	or	3·60 Kg.
	Lime	10·136 Kg.
	+Copper sulphate	10·136 Kg.
3.	Sulphur	19 Kg.
	or	
	Karathane 25% W. P.	400 gm.
4.	Endosulfan 35% E. C.	1 lit
	or	
	Carbaryl 50% W. P.	2·0 Kg.
5.	Demeton-methyl 25% E. C.	1·92 lit
	or	
	Thiometon 25% E. C.	1·92 lit
	or	
	Dimethoate 30% E. C.	1·20 lit

NURSERY

Raise nursery in about 400 sq. ft. area to provide seedlings for one acre. Prepare four seed beds of 25 ft. long, 4 feet wide and 4" high. Rub (brush) the beds with paddy husk or spray with Lannate (0·1 gm in 100 cc. water per 1 sq. metre area). Spread 3-4 baskets of sieved farmyard manure (40 kg/bed) on the beds and them mix well in the soil. Apply 250 gm. Ammonium nitrate, 600 gm. Super phosphate and 200 gm. Sulphate of potash per bed and mix in the soil. Broadcast the seed uniformly on the surface of the seed bed. Gently compress the seed bed and also cover the seed bed after sowing with sieved farmyard manure. Provide water both in the morning and evening. Seedlings will be ready for transplanting in about 6–7 weeks.

TRANSPLANTING

Prepare ridges and furrows at 3 ft apart. Apply 20 Kg. N and the entire quantity of P_2O_5 and K_2O at the time of transplanting. Healthy seedlings are transplanted at a distance at 2 ft. apart between plants. Water the field before transplanting. Apply 10 Kg. N, one month after transplanting.

INTERCULTURE

Interculture is to be done after the establishment of seedlings (2 to 3 weeks) at an interval of 8 to 10 days and continued till the end. Weekly weeding, hand stirring, and desuckering (if topped) is to be done till the crop is harvested. Earthing up operations are also to be done at the time of weeding.

PLANT PROTECTION

Important insect pests and diseases of the crop.

Insects: Cutworm, Leaf eating caterpillar, Stem borer, White fly, Aphid, Grasshopper and Capsule borer.

Diseases: Damping-off, Root knot-nematode, Black-shank, Powdery mildew, Leaf spot, Mosaic and Leaf curl.

Others: Root parasite (Orobanche)

Schedule

1. Treat 400 Sq.ft. nursery area with 250 ml of DBCP 75% E.C. in irrigation water 15 days prior to sowing.

2. Drench the nursery area 2 days before sowing with 120 litres of 1% Bordeaux mixture or 240 gm. Captan or 180 gm. Copper oxychloride or 270 gm. zineb in 120 litres of water.

3. Spray the nursery with 25 litres of 0·5% Bordeaux mixture or 36 gm. Captan or 27 gm. Copper oxychloride or 40 gm. zineb with 23 ml. of Endosulfan or 40 gm. Carbaryl W. P. in 18 litres of water two weeks after sowing Repeat the same spray four weeks after sowing.

   Dissolve 23 ml. Endosulfan or 40 gm. Carbaryl W. P. in 18 litres of water and irrigate.

4. Spray the crop 2 weeks after transplanting with 23 ml Endosulfan or 40 gm. Carbaryl in 18 litres of water.

5. Apply sulphur powder (300 mesh) at 10 Kg./acre in furrows between rows, or spray with Karathane at 18 gm. in 18 litres of water 4 to 6 weeks after transplanting. Repeat the spray if required.

6. Spray the crop 4 weeks after transplanting with 450 litres of 0·5 Bordeaux mixture or 40 gm. Zineb or 27 gm. Copper Oxychloride with 16 ml. of Demeton-methyl or 16 ml. Thiometon or 12 ml. Dimethoate in 18 litres of water. Repeat the same spray at 6, 8 and 10 weeks after transplanting if required.

7. To prevent infestation of Orobanche adopt rotation (avoid bajra in rotation). For control, remove and destroy the parasite before flowering.

HARVESTING

Harvesting starts when the leaves are ripened. A right type of leaf when ripe would be one, which is pale green and has a good body look. Leaves ripe in a flush of 2–3 at a time from the bottom. In all, 18–20 leaves are obtained per plant and leaves are primed 6–8 times depending upon the crop condition.

CURING

After priming, leaves are sorted and tied separately either by single string or double string method on a thin bamboo stick of 4½' length. Leaves are tied back to back. The green leaves are loaded on the top tier and over-riped leaves in the bottom tier with ripe ones in the middle. After the barn is fully loaded flu curing is started.

YELLOWING

The temperature is raised from 90° to 105° F. in about 35 to 40 hours bringing down the relative humidity from 81% to 71% by closing ventilators. This is the time when leaves change colour from green to yellow.

COLOUR FIXING

The temperature is raised from 105° F to 125° F. in 5 to 10 hours by reducing the humidity from 57% to 30% by adjusting the ventilators.

LEAF DRYING

The temperature is raised from 125° to 140° F. in about 25 to 30 hours with a decrease in the relative humidity from 30 to 28% by adjusting the ventilators.

MIDRIB DRYING

The temperature is raised from 140° to 160° F. in 20 to 40 hours with the reduction of the relative humidity to the minimum by closing the ventilators completely. For regulating the temperature and relative humidity Curometers and Hygrometers are used. Sudden raise or sudden fall in temperature should be avoided.

The barn is unloaded, the bulk is conditioned, graded as per schedule, packed and marketed.

YIELD

The average cured leaf yield varies from 300 to 400 Kg. per acre.

BEEDI TOBACCO

It is grown mainly as a rainfed crop. Nursery is raised in June–July and transplanted during August/September.

Varieties	*Duration*	*Area*
1. Choutikudi 2. Anekivi	110–115 days	... Mysore, H.D. Kote, Hassan and Periyapatna
3. S–20	135–145 days	... Belgaum and Bellary districts.
4. Akolgund	120–125 days	...
5. Bhojgund	120–125 days	...

INPUTS PER ACRE

Seed: 6 to 8 gm.

Organic manure: 5 to 10 cartloads of Farmyard manure or Compost.

Fertilizers: 25 kg. N, 8 kg. P_2O_5 and 8 kg. K_2O

Plant protection chemicals

1. Dieldrin 18 % E. C.	.. 1·5 lit
2. Thiometon 25 % E. C.	.. 1 lit
or	
Demeton-methyl 25 % E. C.	.. 1 lit
or	
Dimethoate 30% E. C.	.. 1 lit
or	
Phosphomedon-100 % E.C.	.. 0·200 lit
3. Endosulfan 30% E. C.	.. 150 ml.
or	
Carbaryl 50% W. P.	.. 400 gm.
4. Lime	.. 1 Kg
+Copper sulphate	.. 1 Kg
or	

Copper Oxychloride	1 Kg
or	
Zineb	1 Kg

NURSERY

Raise nursery in an area of about 400 sq. feet to provide seedlings for one acre. Prepare seed beds of 25 ft. long, 4 ft. wide and 4″ high. Apply 40 Kg farmyard manure or compost uniformly on each bed. Apply 250 gm. Ammonium nitrate, 600 gm.Super phosphate and 200 gm.Sulphate of potash per bed. Broadcast seed uniformly. Then press the beds and cover with sieved Farmyard manure. Seedlings will be ready for tranplanting in about six weeks.

TRANSPLANTING

Apply 16 Kg. N, and entire quantity of P_2O_5 and K_2O at the time of transplanting. Plant healthy seedlings, in 3 ft. rows at 3 ft. apart between seedlings in Nippani area. In Hunsur area seedlings are to be transplanted in 3 ft. rows at 2 ft. apart between seedlings. Top dress the crop with 9 Kg N, 4 weeks after planting.

INTERCULTURE

Weekly hand weeding and interculturing is to be done. Topping is to be followed with weekly desuckering. Remove the lower sand leaves till topping is done. Topping is to be done 4–6 weeks after transplanting by allowing 12 to 14 leaves from the bottom of the plant.

PLANT PROTECTION

Diseases : Damping of, Root-knot nematode, Powdery mildew, Leaf Curl and Leaf spot.

Insects: Cut worm, Leaf eating catterpillar, Stem borer, Aphid, Grasshopper and Ground beetle.

Schedule

1. Drench the seed bed with Bordeaux mixture (2–2–50) or with 27 gm. Copper Oxychloride or 40 gm. Zineb dissolved in 18 litres of water before sowing.

2. Spray Bordeaux mixture (2–2–50) or 27 gm. Copper oxychloride or 40 gm. Zineb in 18 liters of water one week after germination.

3. Repeat the same spray mentioned in 2 above four weeks after sowing.

4. Give the third spray if necessary after 6 weeks after sowing or before transplanting. Use copper Oxychloride at 27 gm or 40 gm Zineb in 18 litres of water. 15 to 20 litres of spray mixture is required for spraying the nursery.

Spray the nursery with 27 ml Endosulfan or 100 gm Carbaryl in 18 litres of water if insects are noticed on the Seedlings.

5. Before transplanting, apply Dieldrin at 40 ml in 18 litres of water. The chemical is to be spread 4″ away around the plant.

Spray Thiometon or Demeton-methyl or Dimethoate at 18 ml. in 18 litres of water or apply Phosphomedon at 8 ml. in 18 litres of water if infestation of Aphids is noticed.

Repeat the same at 10–15 days intervals if necessary. 200 to 800 litres of spray mixture is required each time depending upon the stage of the crop.

HARVESTING

The crop will be ready for harvest when a majority of leaves have sprangled and yellowing has commenced. The harvested plants are arranged in the field in an inverted manner for 6–7 sunny days and on the seventh day the leaf lamina is separated from main stem. The stems are further dried for one more week and crushed into powder. The leaf lamina with midribs are packed and marketed.

YIELD

On an average, 200 to 300 Kg powder can be expected from one acre in Nippani area and 150 to 250 Kg in Hunsur area.

SUGARCANE

Sugarcane is one of the important commercial crops of the State. The crop is being grown in about 2·5 lakh acres every year. This crop is mostly concentrated around Mandya, Belgaum, TBP and Bhadra areas. Sugarcane can be grown in all types of soils. High yields can be obtained only in rich, well drained and medium black soils.

Varieties	*Duration*	*Area*
1. CO-419	Late	Entire State
2. IC-225	Early	Mandya Areas
3. CO-740	Early	Belgaum, Bidar and TBP
4. CO-449	Mid-late	Coastal areas

Note: IC-225 variety is suitable for early crushing.

SEASON

The three important sowing seasons are: July-August, October-November and January-February.

INPUTS PER ACRE

Seed Setts: 12,000 setts having 3 eye buds drawn from a crop of 8–10 months old. Use disease free setts. Obtain setts from a crop raised. from a crop for which the setts were subjected to hot water treatment.

Fertilizers

	N	P_2O_5	K_2O
For Mandya Zone	125 kg.	40 kg.	50 kg
For Belgaum area	110 kg.	30 kg.	75 kg
For TBP and Bhadra areas	125 kg.	30 kg.	30 kg
For Heavy rainfall areas	75 kg.	50 kg.	50 kg

Plant protection chemicals

1.	Organo mercurials 6 % W. P.	.. 2 kg

2.	Heptachlor 6%	.. 10 kg
	or	
	Phorate 10% granules	.. 10 kg
	or	
	Chlordane 5%	.. 12 kg
	or	
	Aldrin 5%	.. 12 kg
3.	Endrin 20 % E. C.	.. 3 Lit
4.	Zineb	.. 2·57 kg.

SOWING

After the land is ready, convert the land into ridges and furrows at 3′ apart keeping a depth of 6″ to 8″. Apply 10% of the total N, and the entire dose of P_2O_5 and K_2O in the furrows and mix them well in the soil. Irrigate the field and plant the setts in the centre of the furrow preferably during dry weather. Please see that the eye buds always face sidewords.

TOP DRESSING:

First top dressing should be done after 6 weeks using 20% of total N. Second top dressing should be done after 10 weeks using 30% of total N. The final top dressing should be given after 14 weeks with the remaining 40% N.

In Visvesvaraya canal area, P_2O_5 may be given in split doses *i.e.*, 50% at planting and 50% at 14th week.

IRRIGATION AND INTERCULTURE

Irrigate the crop once in 8 days in case of sandy loam soils and once in 15 days in heavy soils depending upon weather. Earth up the crop at the end of each top dressing.

PLANT PROTECTION

Important insect pests and diseases of the crop

Insects: Early shoot borer, Top shoot borer, Scale insect, Mealy bug, Pyrilla, Root grub and Termites.

Diseases Smut, Grassy shoot, Pineappale disease and Leaf spot.

SCHEDULE

1. Use disease free sets.

2. Dip the sets in Organo mercurial 6 % W.P. (18 gm. Organo mercurial in 18 litres of water) before sowing.
3. Dust the sets in furrows with 12 kg. Aldrin or 12 Kg. Chlordane or 10 Kg. Heptachlor a 10 kg. Phorate at the time of planting, to control Termites and Root grubs.
4. Earth up the crop twice: once at 6 weeks & again at 10 weeks.
5. Remove and destroy dead hearts and infested tops along with borers.
6. Release Trichogramma and Isotima parasites. This applies only to Mandya tract

or

(in place of items 3, 4 and 5)

(i) Spray the crop of a month old with 45 ml Endrin and 40 gm. Zineb in 18 litres of water.

(ii) Repeat the same spray 8 weeks, 12 weeks, 16 weeks and 20 weeks after planting.

WEED CONTROL

Dissolve one Kg. 2-4D in 270 to 360 litres of water and spray the same five days after planting. Repeat the same spray again 25 days after planting on weeds. Avoid Spray drift reaching other susceptible crops (cotton, grapes, cucurbits and Leguminous crops) if any in the vicinity

OR

Dissolve 1·5 Kg. Simazine in 270 to 360 litres of water and spray the soil 2-3 days after planting cane. This will kill most of the annual weeds. Soil should be in fine tilth at the time of spray. There should also be moisture in the soil at the time of spray.

YIELD

The crop will be ready for harvest in 10-14 months depending upon the variety and time of planting. The crop should be harvested before arrowing. About 50 tons of cane can be expected from one acre.

RATOON CROP

Ratoon crop also requires the same quantity of fertilizers. Taking one ratoon crop is economical. The crop harvested early will give better yields.

GROUNDNUT–IRRIGATED

Groundnut is an important oilseed crop of the State. The crop is being grown in about 24 lakh acres every year. The crop can be grown both under rainfed and irrigated conditions. High yields are obtained only under irrigation.

Varieties	*Duration*
1. Spanish improved	... 105 to 110 days
2. T.M.V.-2	... 105 to 120 „
3. S.206	... 105 to 110 „
4. H. G. 8	... 115 to 120 „

1 to 4: All bunch varieties

SEASON

As a main crop, it should be sown before the end of June. The other season for sowing is last week of December to end of January.

AREA

Spanish improved and T.M.V-2 are more suited to Dharwar, Belgaum, Bijapur and southern districts of Mysore. S-206 is suited to Raichur, Bidar and Bellary districts. H.G-8 is suited to southern districts.

INPUTS PER ACRE

Seed: 40 Kg. kernel

Fertilizers

Northern districts: 10 Kg, N, 30 Kg. P_2O_5 and 10 Kg. K_2O
Southern districts: 10 Kg. N, 30 Kg. P_2O_5 and 15 Kg. K_2O

Note: Fertilizer recommendations should be based on soil tests as far as possible.

Plant Protection Chemicals

1. Captan or Thiram	.. 100 gm.
2. Dimethoate 30 % E. C.	.. 900 ml

3.	Carbaryl 50% W. P.	3 Kg.
	or	
	Parathion 50% E. C.	1 Lit.
	or	
	Malathion 50% E. C.	2 Lit.
4.	Zineb	1 Kg.
	or	
	Duter	1 Kg.
5.	Heptachlor 6%	18 Kg.
	or	
	Phorate 10% granules	10 Kg.
	or	
	Aldrin 5%	20 Kg.
	or	
	Chlordane 5%	20 Kg.

SOWING

After the land is ready, apply entire dose of fertilizers and mix them well in the soil. In case of HG-8 sow the seed in 12″ rows at 6″ apart. In case of Spanish Improved, S-206 and T.M.V. 2 the seed should be sown in 10″ rows at 6″ apart. The seed should not be sown deeper than 2″.

IRRIGATION AND INTERCULTURE

Irrigate the crop once in 8 days in case of sandy loam soils and once in 10–12 days in case of heavy soils depending upon weather conditions.

Pass the hoe between rows 15 days, 30 days and 45 days after sowing. Keep the land free from weeds. No interculture operations are to be done after 45 days from sowing.

PLANT PROTECTION

Important insect pests and diseases of the crop

Insects: Aphids, Leaf minor, Red-headed hairy caterpillar, Termite and Root-grub.

Diseases: Tikka, Root rot and Collar rot.

Schedule

1. Incorporate 20 Kg. Aldrin or 20 Kg. Chlordane or 18 Kg. Hepatchlor or 10 Kg. Phorate into the soil before sowing to prevent the attack of Termites and Root grubs.

2. Treat the seed with Captan or Thiram at 2 gm. per Kg. seed.
3. Spray the crop of 25 days old with 30 ml. Dimethoate or 36 ml. Malathion and 40 gm. Duter or 40 gm. Zineb in 18 litres of water.
4. Spray the crop again with 18 ml. Parathion or 80 gm. Carbaryl and 40 gm. Duter or 40 gm. Zineb in 18 litres of water 50 days after sowing. Use 180 to 270 litres of spray mixture per acre.
5. Spray the crop again using the chemicals metioned in item No. 4 90 days after sowing.

Note: 1. Insecticides may be added in the early three sprays only when Aphids are observed.

2. Apply soil insecticides only in areas of previous infestation by Root grubs or Termites.
3. Follow regular crop rotation
4. Measures suggested in item 4 and 5 be given only if Leaf miner appears. However, Zineb should be sprayed to control Tikka disease.

WEED CONTROL

Spray the soil with 4 litres of Nitrogen dissolved in 270 to 360 litres of water on the same day or a day after sowing. Do not trample the soil after spraying the chemical. Please see that there is sufficient moisture in the soil at the time of spray. All weeds propagated by seed except Acanthospermum can be controlled by this chemical.

YIELD

The crop will be ready for harvest in 105 to 120 days depending upon the variety. About 10 to 15 quintals pods can be expected per acre.

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GROUNDNUT–RAINFED

Groundnut is also grown as a dry crop in several parts of the State. All the varieties recommended for irrigation can be grown under rainfed conditions.

	Varieties		*Duration*
1.	Spanish improved*	...	105 to 110 days
2.	T.M.V.-2*	...	105 to 120 „
3.	S.206*	...	120 to 130 „
4.	Pondicherry-8**	...	135 to 145 „
5.	H. G.-10*	...	135 to 140 „
6.	S-230**	...	135 to 140 „
7.	S.B.-11*	...	110 to 115 days

*Bunch type **Spreading type

AREA

Spanish improved, T.MV.-2 and S.B. 11 are more suited to Dharwar, Karwar, Belgaum and Bijapur districts. S-206 is more suited to Raichur, Gulbarga, Bellary and Bidar districts. S-230 and Pondicherry-8 are suited to Gulbarga, Bidar and Bijapur districts. Pondicherry-8, H.G.-10 and S-230 are also suited to Southern districts of Mysore State.

SEASON

The bunch varieties can be sown in May and June and the spreading varieties from the end of June to end of July.

INPUTS PER ACRE

Seed:	Bunch type	..	40 Kg. Kernel
	Spreading type	..	30 Kg. Kernel

Fertilizers

10 Kg. N, 20 Kg. P_2O_5 and 10 Kg. K_2O

Note: Fertilizer recommendation should be based on soil tests as far as possible.

Plant Protection Chemicals

1.	Captan or Thiram	..	80 to 100 gm.
2.	Dimethoate 30% E. C.	..	900 ml.
3.	Carbaryl 50% W.P.	..	3 Kg.
	or		
	Parathion 50% E. C.	..	500 ml.
4.	Zineb	..	1 Kg.
	or		
	Duter		1 Kg.
5.	Heptachlor 6%	..	18 Kg.
	or		
	Aldrin 5%	..	20 Kg.
	or		
	Chlordane 5%	..	20 Kg.
	or		
	phorate	..	10 Kg.

SOWING

After the land is ready, apply the entire dose of fertilizers and mix them well in the soil. In case of HG-10 the seeds are to be sown in 12″ rows at 6″ apart. In case of Spanish Improved, S-206, S.B-11 and T.M.V-2 the seeds should be sown in 10″ rows at 6″ apart. The spreading varieties *i.e.*, Pondicherry-8 and S-230 should be sown in 18″ rows at 6″ apart.

PLANT PROTECTION

Follow the same plant protection measures suggested for irrigated crop, whenever necessary.

WEED CONTROL

Follow the same weed control measures suggested for irrigated crop.

YIELD

Crop will be ready for harvest in 105 to 145 days depending upon the variety. About 350 to 500 Kg. pods can be expected per acre.

SAFFLOWER–IRRIGATED

Safflower is one of the important oilseed crops of the State. This is mostly grown as a rainfed crop in the northern districts. It has been found that the crop responds very well to irrigation and fertilizer application.

VARIETIES

1. 7–13–3	..	115 to 120 days
2. A-300	..	115 to 120 days

SEASON

Sowing can be done from the middle of October to the middle of November.

AREA

These varieties are recommended to all the Safflower growing areas of the State.

INPUTS PER ACRE

Seed: 3 Kg.

Organic manure: 2000 to 2500 Kg. Farmyard manure or Compost.

Fertilizers: 30 Kg. N, 30 Kg. P_2O_5 and 15 Kg. K_2O

Note: Fertilizer recommendation should be based on soil tests wherever possible

Plant protection chemicals

Endrin 20% E. C.	..	1 lit.
or		
Parathion 50 % E. C.	..	400 ml.
or		
Dimethoate 30%	..	360 ml.

SOWING

Sow the crop in 2′ rows at 12″ apart between seeds. Apply the entire dose of fertilizers before sowing.

IRRIGATION AND INTERCULTURE

Irrigate the field before sowing. Repeat subsequent irrigations once in 20–25 days in case of black soils and once in 8 to 10 days in case of red soils. depending upon weather conditions.

PLANT PROTECTION

Important insect pests and diseases of the crop

Insects: Aphid and Leaf eating caterpillar

Diseases: No major diseases

Schedule

1. Spray the crop with 45 ml. Endrin or 18 ml Parathion or 30 ml. Dimethoate in 18 litres of water when the Aphids or Leaf eating caterpillars appear. Use about 200 litres of spray mixture per acre. Repeat the same spray if the pest persists.

YIELD

An acre of crop can yield about 8 quintals.

SAFFLOWER–RAINFED

Safflower is mostly grown as a dry crop in the districts of Dharwar, Belgaum, Raichur and Gulbarga. This is being grown in about 4 lakh acres every year.

Varieties	*Duration*
1. 7-13-3	115 to 120 days
2. A-300	115 to 120 days

SEASON

The best season for sowing is the first fortnight of October.

AREA

These varieties are recommended to all the Safflower growing areas of the State.

INPUTS PER ACRE

Seed: 3 Kg.

Organic manure: 2000 Kg. Farmyard manure or Compost.

Fertilizers: 15 Kg. N, 20 Kg. P_2O_5 and 10 Kg. K_2O

Note: Fertilizer recommendation should be based on soil tests wherever possible.

Plant Protection Chemicals

1. Endrin 20% E. C.	.. 1 Lit.
or	
2. Parathion 50% E. C.	.. 400 ml
or	
3. Dimethoate 30%	.. 360 ml

SOWING

After the land is ready, apply the entire dose of fertilizers by drilling in 2′ furrows. Sow the crop at 12 inches apart between seeds.

PLANT PROTECTION

Follow similar plant protection practices suggested for irrigated crop, if necessary.

YIELD

An acre of rainfed safflower can yield about 4 quintals.

CASTOR

Castor is one of the important oilseed crops of the State. This is being grown in about one lakh acres.

This can be grown in Red sandy loam, Red loam and Light black soils throughout the State. This crop is highly sensitive to water logged and alkaline soils.

Variety: NPH-1 (Aruna) ... 125 to 130 days.

SEASON

June and July are the suitable months for sowing.

INPUTS PER ACRE

Seed: 5 to 6 Kg.

Fertilizers

Rainfed crop: 15 Kg. N, 15 Kg. P_2O_5 and 10 Kg. K_2O

Irrigated crop: 25Kg. N, 25 kg. P_2O_5 and 10 Kg. K_2O

Note: Fertilizer recommendation should be based on soil tests wherever possible.

Plant Protection Chemicals

1. Endrin 20%	.. 2 lit.
or	
2. Parathion 50%	.. 1 lit.
or	
3. Parathion 2% dust	.. 8 Kg.

SOWING

Sow the seed in 2′ rows at 1½′ apart between seed. Dibbling is always the best. Apply 50% N and the entire dose of P_2O_5 and K_2O just before sowing. Topdress the crop with the remaining 50% N, 40 to 45 days after sowing about 4″-6″ away from the plant in the form of a ring.

IRRIGATION AND INTERCULTURE

Provide protective irrigation particularly in light soils upto 90 days. Nip the side shoots regularly. This helps in giving a big spike and uniform maturity.

Note: If the crop is taken as an entirely irrigated crop, irrigation should be stopped on 75th day and nipping should be practised so as to enable the crop to mature in 120 to 125 days.

PLANT PROTECTION

Important insect pests and diseases of crop

Insects: Semi-looper and Capsule borer.

Diseases: No major diseases.

Schedule

1. If Semi-looper is noticed, dust with 8 Kg. Parathion dust or spray the crop with 45 ml. Endrin or 18 ml. of Parathion in 18 litres of water.
2. Spray the crop with 45 ml. Endrin or 18 ml. Parathion in 18 litres of water at the time of flowering.
3. Repeat the same spray 15 days later. About 200 litres of spray mixture is required per acre.

YIELD

About 800 to 1000 Kg. can be expected from an acre of irrigated crop. The rainfed crop may yield about 400 to 600 Kg. per acre.

BENGALGRAM–RAINFED

Bengalgram is one of the important pulse crops of the State. This crop is mostly grown in the northern districts.

VARIETY

Annigeri No. 1 is a high-yielding variety recommended for the entire State. This gives 20% more yield over Chaffa, a local variety. Annigeri No. 1 can tolerate wilt, which is one of the important diseases. This has medium grains which are somewhat round and smooth. The grains are light brown in colour without wrinkles. The duration is 95 to 100 days.

SEASON

Bengalgram is mostly grown in winter. The best time for planting is from middle of October to middle of November.

INPUTS PER ACRE

Seed: 20 Kg.

Organic manure: 2000 to 2500 Kg. Farmyard manure or Compost.

Fertilizers: 5 Kg. N and 10 Kg. P_2O_5.

Note: Fertilizer recommendation should be based on soil tests wherever possible

Plant protection chemicals

Carbaryl 50% W.P.	.. 200 gm.
or	
Carbaryl 10% dust	.. 16 Kg.
or	
Parathion 50% E. C.	.. 36 ml.
or	
Parathion 2% dust	.. 16 Kg.

SOWING

After the land is ready for sowing, apply the entire dose of fertilizers in 12″ rows using a seed drill. Sow the seed at 3″ to 4″ apart. Care should be taken to sow the seed about 3″ away from fertilizer.

Intercultivate the crop twice, depending upon the soil and weather. Keep the land free from weeds.

PLANT PROTECTION

Important insect pests and diseases of the crop

Insects: Gram caterpillar
Diseases: Wilt

Schedule

Spray the crop with 100 gm Carbaryl WP or 18 ml. Parathion in 18 litres of water whenever gram caterpillar is noticed.

In place of insecticides.

Dust Parathion dust at 8 Kg per acre per dusting.

or

Dust Carbaryl dust at 8 Kg. per acre per dusting.

Repeat spraying or dusting after 10 days if the pest or disease persists.

YIELD

About 4 quintals gram can be expected per acre.

COWPEA

Cowpea is one of the important cash crops. It is also grown as a mixed crop. But these cultivation practices apply only to whole crop.

VARIETIES

1. E. C. 4216
2. Type-2
3. C. 152

All the above varieties mature in 90 to 100 days.

SEASON

Sowing is done in June-July. Type 2 can be grown in February and March.

INPUTS PER ACRE

Seeds: 8 to 10 Kg
Organic manure: 2000 to 2500 Kg Farmyard manure or Compost.
Fertilizers: 10 Kg. N, 20 Kg. P_2O_5 and 10 Kg. K_2O
Plant Protection Chemicals

1. Dimethoate 30 E. C.	.. 700 ml.
or	
2. Phosphomedon 100% E. C.	.. 220 ml.
or	
3. Parathion 50% E. C.	.. 450 ml.

SOWING

After the land is ready for sowing, apply the entire dose of fertilizers. Sow the seed in 1½′ rows. Thinning is to be done to retain 6 to 9 inches spacing, between plants.

PLANT PROTECTION

Important insect pests and diseases of the crop

1. Insects: Aphid
2. Diseases: Mosaic

Schedule

Spray 30 ml. Dimethoate or 9 ml. Phosphomedon or 18 ml. Parathion in 18 litres of water, whenever Aphid infestation is noticed.

Repeat the same spray after 15 days, if the insect/disease persists.

YIELD

4 to 5 quintals can be expected from one acre of whole crop.

REDGRAM (TOGARI)

Togari is one of the important pulse crops of the State, mostly grown as a mixed crop in kharif season. It is also grown as a whole crop in Gulbarga district. This applies to whole crop only.

VARIETIES

1.	C-28	... 150 to 160 days
2.	T-21	... 125 to 135 days
3.	F-52	... 230 to 240 days

F-52 is recommended only for the transitional zone as mixed crop.

SEASON

The best season for sowing is June and July.

INPUTS PER ACRE

Seed: 6 to 8 Kg.
2 Kg. when sown as a mixed crop.

Organic manure: 2000 to 2500 Kg. of Farmyard manure or Compost.
Fertilizers: (For entire crop) 10 Kg. N, 20 Kg. P_2O_5 and 10 Kg. K_2O

Plant protection chemicals

DDT 50% W.P.	.. 1·4 Kg.
or	
Carbaryl 50% W.P.	.. 1·5 Kg.
or	
Parathion 50% E. C.	.. 700 ml.

SOWING

After the land is ready for sowing, apply the entire dose of fertilizers.

Sow C 28 in 2½ ft. rows and T. 21 in 2 ft. rows.

Thinning is to be done to retain 9″ to 12″ spacing between plants.

PLANT PROTECTION

Important insect pests and diseases of the crop

Insects: Pod borer
Diseases: Wilt

Schedule

1. Spray the crop with 115 gm. Carbaryl or 18 ml. Parathion or 100 gm. of DDT in 18 litres of water at the time of flowering.
2. Repeat the same spray after 15 days.
3. Give the third spray 15 days after the second spray if the insect/disease persists.

YIELD

6 to 8 quintals gram can be expected from an acre of whole crop and 6 to 4 quintals as a mixed crop.

CHEMICAL WEED CONTROL

Weed control can substantially contribute to increase in crop yields. It is estimated that losses due to weeds range from 5 to 30 per cent. Weeds compete with crop plants for nutrients and available soil moisture. It is found that in a maize field, the average nutrient content per unit weight of weeds compared to nutrient content of maize showed about twice as much Nitrogen, 1.6 times as much Phosphorus and 3·5 times as much Potassium. Besides, the evapo-transpiration, in a weedy onion field is double that of fields in which weeds are controlled.

Use of chemicals to control weeds is becoming common in our country. Use of a particular chemical for a crop or crops is a more recent development. Many of these weedicides have varying degrees of residual effect, which has the advantage of checking the growth of weeds throughout the crop growth. Some of them which are used as pre-emergent weedicides, have the advantage of eliminating weed-crop competition specially during the initial stages of crop growth. On account of the advantages and to overcome the other physical disadvantages like non-availability and high cost of labour (wherever it exists) weedicides can be used with advantage.

On account of the varying nature of the chemical specificity for a crop and the varying times of application, it is important that in chemical weed control, *One has to use the Right type of weedicides at the Right time to the Right crop and apply the Right dosage.*

Since weedicides may be toxic to man and domestic animals they should be used with care. The following precautions in their handling will minimise the hazards in their use.

* Read the label carefully and follow precautionary directions, no matter how often you use a weedicide or how familiar you are with the directions.
* Keep weedicides out of reach of children, pets, and live-stock. Store them away from food, feed, and seed, and always in their original containers tightly closed.
* Avoid inhaling sprays or dusts, and wash hands and face. Change clothing after applying weedicides.

- * If weedicides are accidentally spilled on skin or clothing, remove clothing immediately and wash the cloth and skin thoroughly.
- * If any illness occurs during or immediately after applying weedicides, consult a doctor.
- * Dispose off left over material and empty containers so that they pose no hazard to human, animals, plants or wild life; for example, do not dispose of these materials in drainage channels.
- * Do not siphon liquids from containers or blow out clogged lines and nozzles of sprayers by mouth. Keep the equipment in proper working order.
- * Confine chemicals to the crop being treated by preventing the drift of spray or dust to other crops. Avoid spray applications during dry or hot water.
- * The weedicides must be mixed thoroughly with water before spraying. Full spray coverage of the weed foliage is necessary. Spray must be uniform and overlapping should be avoided. It should be stored in a cool, dry place.
- * Where a Post emergent herbicide is to be used mix a detergent (teepol) at 0·1% unless otherwise it is mentioned that the preparation already contains it.
- * If the preparation is a weettable powder and if rocker type of sprayer is used, constantly stir the container in which the weedicide is kept.
- * Wash sprayer thoroughly after use. It is preferable to have a separate sprayer for weedicides.

Based on the experiments conducted in the University, recommendations are made in Table I in respect of some important crops.

TABLE I.

	Crop	Weedicide	Quantity/ Acre	Volume /* Acre	Time of Application	Weeds controlled	Remarks
1	Paddy	2, 4–D	1 kg.	270–360 Litres of water	Post emergent. spray within 3–4 weeks after transplanting.	Dicot weeds, some annual grasses and sedges.	Avoid drift reaching other crops. Cotton, cucurbits potato and legumes are highly sensitive to 2,4-D.
	Paddy	Propanil	3–4 lit	-do-	Post emergent. Spray when weeds are young 1–2 leaf stage.	All weed seedlings.	Drain the field 24 hours before spraying and let in water 24 to 36 hours after spray. Do not mix with other chemicals.
2	Sugarcane	2, 4–D	1 kg.	-do-	Pre-Post-emegrent. Spray once 5 days after planting cane. Second time 25 days after planting.	Dicot weeds	Avoid drift reaching other crops. like cotton, cucurbits potato and legumes which arehighly sensitive to 2,4-D.
	Sugarcane	Simazine	1½ kg.	-do-	Pre-emergent. Spray soil two or three days after planting cane.	All weeds which are propagated by seed.	Soil should be in fine tilth at the time of spray.
3	Maize	Simazine	1½ kg.	-do-	Pre-emergent Spray soil same day or a day after sowing.	-do-	Presence of sufficient moisture in soil is essential for effective action of weedicide.
4	Jowar	Atrazine	300 to 400 gm	-do-	Pre-emergent. Spray soil the same day or a day after sowing.	-do-	Presence of sufficient moisture in the soil is essential. Higher dosage of the chemical will affect germination adversely.
5	Cotton	Diuron	400 to 500 gm	-do-	Pre-emergent. Spray the soil the same day or a day after sowing cotton.	-do-	The soil should be in fine tilth at the time of spray and there should be sufficient moisture in the soil.
6	Groundnut	Nitrogen	4 lit	-do-	-do-	All weeds except Acanthospermum Sp.	Sow the seed and then spray the weedicide. Avoid trampling the field after spray of the chemical.

*It is assumed that generally a high volume sprayer is used. It is preferable to have a separate sprayer for the use of weedicides, and/or otherwise after each use, the sprayer has to be washed thoroughly.

FOLIAR APPLICATION OF FERTILIZERS

Some of the fertilizers and micronutrient salts, soluble in water may be applied directly to the aerial parts of plants. This method provides for more rapid utilisation of the applied nutrients. The deficiencies noticed could thus be corrected in a short period of time.

Advantages

Since nutrients applied are directly absorbed through the leaves, effect could be observed within a short period of time. The deficiency symptoms will therefore disappear quickly.

With soils that have " fixation " problem for some of the nutrients, foliar application constitutes most effective means of correcting the nutrient defiiciencies. The main reason for recommending the foliar application of micronutrients to the fruit trees for correcting their deficiencies has been the ineffectiveness of soil application due to the " fixation ".

Nutrient sprays can be combined with regular plant protection schedules, so that there will be a saving in labour.

Disadvantages

One of the main disadvantages of foliar application is that, it is difficult to apply adequate quantities of N-P-K. without causing injury to the leaves and without using unduly large volume of solutions or number of spraying operations. Foliar sprays would only be excellent supplement to soil application at least major elements.

Can all the nutrients be applied as foliar sprays?

The present experience with several field crops and fruit trees is that good results can be had from foliar spray application of nitrogen and micronutrients. Some vegetable crops also respond to foliar application of potassium. However, in most cases such responses are temporary and repeated applications will be necessary.

Composition and dosage of foliar sprays

Out of all the fertilizers, Urea is ideally suited for foliar spray and it can be sprayed on all crops in all types of soils for immediate recovery of crops suffering from nitrogen deficiency. Other common N.P.K. fertilizers are not so effective. In general, organic forms of elements can be applied in greater concentration than the mere highly ionised inorganic forms. Nitrogen may be applied in foliar spray with a concentration of 5 kg. urea dissolved in 250 litres of water, and at a time 650 litres of the solution may be sprayed over an acre. About 2-3 such sprays will have to be given at an interval of a week, depending upon the severity of the deficiency.

RATS AND THEIR CONTROL

Rat menace is common to all the crops. Their menace is noticed right from sowing to harvest and continues even in storage.

In the field, they carry away the seeds after sowing, resulting in gappy appearance of the crop. They feed on succulent stems and roots, cut the maturing earheads, and feed on them. They not only feed on the earheads but also carry them away for storing in their burrows for future consumption.

There are several methods of rat control like trapping, baiting and fumigation, of which poison baiting and fumigation can be successfully organised by co-operative effort of all the farmers in a contiguous area to prevent immigration of rats from the untreated fields.

STEPS INVOLVED IN EFFECTIVE RAT CONTROL

1. Detect live burrows

In the evening, close all the burrows in the field using wet earth. Next morning checkup and find out burrows which have been opened. These are the live burrows.

2. Prebait.

In order to overcome the suspicion of rats use plain baits like, wheat, bajra, jowar or maize flour mixed with vegetable oil, for two or three days. When the rats start accepting the bait, it is time to poison them.

3. Poison bait

Usually zinc phosphide is preferred, being an acute poison and quick in action.

Ingredients for poison bait:

(*a*) Zinc phosphide	.. 3 parts
(*b*) Flour	.. 95 parts
(*c*) Edible oil	.. 2 parts
OR	
(*a*) Anticoagulants (Ratifin or or Warfarin)	.. 5 parts
(*b*) Flour	.. 92 parts
(*c*) Edible oil	.. 3 parts

Mix the above ingredients thoroughly. Use the bait at the rate of 15 gm/live burrow.

Precautions

These are highly poisonous and should be handled with extreme care.

(1) Do not mix the poison with hand.

(2). Use a long wooden spoon for placing bait in the burrow.

(3). Do wash hands thoroughly with soap and water.

(4). Dispose off the unconsumed baits so that domestic animals and children will not have access to them.

(5). Collect the dead rats and dispose them off by burrying properly to prevent secondary poisoning in domestic animals like cats and dogs which feed on them.

Fumigation

Fumigation has to be resorted to get rid of the residual rat population young ones etc.,

To establish the net work of burrows, pump inert material like chalk dust into one burrow and mark out rest of the burrows from which the dust comes out. Then leaving one burrow, close the remaining marked burrows. Give five to six strokes with the cynogas foot pump after replacing the chalk powder with cynogas poweder; finally close it with wet earth. Three burrows can be covered with 60–90 gm. fumigant.

OR

Insert 0·6 gm. Aluminium phosphide tablet into each live burrow with the help of a bamboo stick and close the burrow.

INSECT PESTS OF STORED GRAINS AND THEIR CONTROL

Grains, whether meant for consumption or for seed purpose, are subjected to be affected by a group of insects in addition to rats and fungi, if they are not stored properly. Among the several insect pests that occur in storage, Rice, weevil, Lesser grain borer beetle, Flour beetle, Saw-toothed grain beetle Flat grain beetle, Pulse beetle, Rice moth and Angomois grain moth or Paddy moth are important.

These insect pests gain their entry into the stores and other receptacles through two sources; first from the field and the second through infestation lurking in the stores. Hence, it is very necessary that one should adopt both preventive and curative control measures, while storing the harvested grains.

Preventive measures

1. *Pre-harvest treatment:* The earheads of the crops like paddy, jowar, pulses (pods) and maize (cobs) should be sprayed with Malathion (premium grade is preferable) 50% at the rate of 1 ml. in 1 litre of water or dusted with Malathion 5% dust, 15 days before harvesting.

2. *Drying:* Stored grain is known to be highly susceptible to insect attack and insect development when the moisture content of the grains is more than 8%. Hence, it is necessary to dry the harvested grains (in sunlight or through the driers, if available) to bring the moisture content below to that level, before storing.

3. *Cleaning of grains:* Remove the broken grains and other extraneous material by cleaning preperly.

4. *Cleaning of stores:* Stores and other receptacles should be cleaned well Cracks and crevices, if any, should be closed; the inner surfaces of the stores must be sprayed with Malathion at one ml. in one litre of water, before storing the grain.

5. *Dusting with Malathion 5%:* After storing the grain, the top surface of the grain, external surfaces of the gunny bags, etc., should be dusted with Malathion 5% dust. Grain may also be stored in Malathion impregnated gunny bags to prevent the attack of insects from external source. Dip the bags in malathion solution containing 18 ml. in 18 litres of water. Dry the bags in shade before filling the grain. Use premium grade Malathion.

6. *Air-tight condition:* Wherever possible the godown, bins, and stores should be covered with suitable lid and made air-tight, as air-tight condition has been found to prevent further multiplication of the insects, even if there was some infestation at the time of storing the grain.

7. *Fumigation:* If facilities are available, grain may be fumigated with a suitable fumigant (given under curative measures) before storing, to kill the insects, if any.

Note: It is very necessary that the stored grain, irrespective of the methods of storage, should be checked atleast once a month and if there is an indication of slight infestation, the grain should be treated as follows:

(*i*) *Fumigation:* Soon after noticing the infestation of the stored grain, take up fumigation by using one of the following fumigants

(*a*) EDB at 3 ml. per quintal of grain or 2–3 lbs. per 1000 cft space. The period of exposure would be 7 days (EDB ampules are available in the mar-ket.

(*b*) Phostoxin tablets: to be used at the rate of 8 tablets per ton of grain allowed for 4 days. Phostoxin should not be used in dwelling houses.

(*ii*) *Dusting with Malathion 5% dust:* Protective dusting of Malathion 5% dust at the top of the grain surface should be undertaken at an interval of one month, after fumigation.

COMPATIBILITY CHART OF PLANT PROTECTION CHEMICALS

This chart has been prepared based on the spray compatibility chart of 1968 published by Meister Publishing Co., Willoughby, Ohio. Certain solvents and emulsifying agents may change the compatibility of some of these chemicals. The spray compatibility indicated herein refers to chemical, physical and phytologic compatibility and is not intended to refer to residues or residue tolerances. The information provided is only an aid to preliminary planning but in the actual application of sprays and use of other chemicals and other materials exclusive reliance should be placed upon directions and information supplied by the manufacturers.

Antibiotics: Although most effective when used alone, Streptomycin and Agrimycin may be combined safely with Aldrin, Arsenate of lead, captan, fixed coppers, DDT, parathion, wettable sulphur, manab and zineb. Do not combine with BHC or Chlordane. Do not combine with Bordeaux mixture or other materials with an alkaline reaction.

Urea: Generally compatible except for caution with lime sulphur and sevin.

Nutrient Sprays: Nutrient sprays containing Boron, Magnesium, Manganese, Iron, Zinc and Urea should be applied separately unless compatibility is known.

COMPATIBILITY CHART OF PLANT PROTECTION CHEMICALS

	Lime Sulphur	*Wettable Sulphur*	*Captan*	*Organomercurials*	*Zineb, Thiram Ziram, Maneb*	*Fixed Coppers*	*Bordeaux*	*Sevin (Carbaryl)*	*Rogor(Dimethoate)*	*Dimecron (Phosphomedon)*	*Diazinon*	*Malathion*	*Systox, Metasystox. Schradan(OMPA).*	*Parathion, Methyl Parathion*	*Endrin, Aldrin, Heptachlor, Chlordane*	*BHC, Lindane*	*D.D.T.*
D. D. T.	+[2]	++[6]	++[5]	++	++[6]	++	++	++	++	++	++	++	++	++	++	++	
BHC, Lindane	+[2]	++	++[5]	++	++	++	+[2]	++	++	++	++	++	++	++	++		++
Endrin, Aldrin, Heptachlor, Chlordane	++	++	++[5]	++	++	++	++	++	++	++	++	++	++	++		++	++
Parathion, Methyl-Parathion.	—	++	++[5]	+[1]	++	++	—[4]	++	++	++	++	++	++		++	++	++
Systox, Metasystox Schradan (OMPA)	—	++	++	+[1]	++	++	—[4]	++	++	++	++	++		++	++	++	++
Malathion	—	++	++[5]	+[1]	++	++	—	++[6]	++	++	++		++	++	++	++	++
Diazinon	+[1]	++	++	++	++	+[2]	+[2]	++	++	++		++	++	++	++	++	++
Dimecron (Phosphomedon)	—	++[6]	++	++	++	++	—[4]	++	++		++	++	++	++	++	++	++
Rogor (Dimethoate)	—	++	++	++	++	++	—	++[6]		++	++	++	++	++	++	++	++
Sevin (Carbaryl)	—	++	++	++	++	++	—		++[6]	++	++	++[6]	++	++	++	++	++
Bordeaux	—	++	—	+[1]	+[2]	++		—	—	—[4]	+[2]	—	—[4]	—[4]	++	+[2]	++
Fixed coppers.	—	++	+[1]	+[1]	+[2]		++	++	++	++	+[2]	++	++	++	++	++	++
Zineb, Thiram, Maneb, Ziram.	—[3]	++	++	++		+[2]	+[2]	++	++	++	++	++	++	++	++	++	++[5]
Organomercurials	—	++	++		++	+[1]	+[1]	++	++	++	++	+[1]	+[1]	+[1]	++	++	++
Captan	—	++		++	++	+[1]	—	++	++	++	++	++	++[5]	++[5]	++[5]	++[5]	++[5]
Wettable Sulphur	++		++	++	++	++	++	++	++	+[5]	++	++	++	++	++	++	++[5]
Lime Sulphur		++	—	—	—[3]	—	—	—	—	—	+[1]	—	—	—	++	+[2]	+[2]

++ = *Safe* + = *Caution* — = *Incompatible*

KEY

1. Not usually mixed together or compatibility not known.

2. When mixed with water, decomposes after standing. With a Ziram mixture, adding ½ pound skim milk to 100 gallons of spray may prevent decomposition.

3. Not recommended, except as directed by manufacturer. Presence of calcium compound may change residual fungicidal nature of Dithiocarbamates to eradicate type without residual action.

4. Bordeaux may be used with Guthion or parathion on grapes with caution No. 2.

5. Use wettable powder forms only.

6. Combinations of sevin and Malathion may cause injury to cotton.

FERTILIZER READY RECKONER

How to use this Ready Reckoner ?

1 This Ready Reckoner tells you the quantities and doses of fertilizers recommended per acre, for different crops.

2 Read the contents carefully. When in doubt consult the local Extension man.

3 Become familiar with the Reckoner. Under the column 'Fertilizer' several simple and compound fertilizers generally available in Bangalore district are indicated. The figures in brackets refer to the approximate percentage of nutrients.

In top horizontal column different crops are given. The figures in the bracket given for each crop are the quantities of nutrients in Kgs. per acre, recommended in terms of Nitrogen, Phosphoric acid and Potash.

The column under each crop gives the quantity of fertilizers required per acre in Kgs. Whenever two or more figures occur against a fertilizer, the first refers to the basal dose and the subsequent figure to the top dressing.

4 For any related crop in the case of simple fertilizers, use any one of the Nitrogenous (Ia) Phosphatic (Ib) and Potassic fertilizer (Ic) as recommended.

5 For any given crop in the case of compound fertilizers, use the entire group of fertilizer indicated in the table.

6 Basic slag and Rock Phosphate should be used only on soils of acid reaction, on specific recommendations.

7 For potato crop use preferably Sulphate of Potash, if available, for better keeping quality.

8 Also follow other recommended techniques of crop production.

FERTILIZER READY RECKONER—KGS. PER ACRE

FERTILIZERS	*Suma Jenugudu* 25 : 15 : 15 1	*Jaya, I.R. 8, I.R. 20 Paddy* 60 : 30 : 30 *(Summer)* 2	*Jaya, I.R. 8, I.R. 20, Paddy* 50 : 25 : 25 *(Kharif)* 3	*Jaya, I.R. 8, I.R. 20 Paddy* (40 : 30 : 35) *(South Canara)* 4	*Jaya, I.R. 8, I.R. 20 Paddy* (50 : 25 : 25) *(Drill sown)* 5	*Hybrid Maize* (60 : 30 : 15) *(Irrigated)* 6	*Hybrid Maize* (35 : 20 : 10) *(Dry)* 7	*Hybrid Jowar* (50 : 30 : 15) *(Irrigated)* 8	*Hybrid Jowar* (40 : 30 : 15) *(Transition area)* 9	*Hybrid Jowar* (25 : 15 : 10) *(Other areas)* 10	*Hybrid Bajra* (40 : 25 : 10) *(Irrigated)* 11	*Hybrid Bajra* (20 : 10 : 0) *(Dry)* 12	*Purna Ragi* (40 : 20 : 20) *(Irrigated)* 13	*Ragi* (20 : 20 : 10) *(Dry)* 14	*Wheat* (60 : 40 : 30) *(Irrigated)* 15	*Wheat* (20 : 10 : 0) *(Dry)* 16	*Sugarcane (Mondya Zone)* (125 : 40 : 50) 17	*Sugarcane (Belgaum Area)* (110 : 30 : 75) 18	*Sugarcane (T.B.P. and Bhadra areas)* (125 : 30 : 30) 19	*Sugarcane (Heavy rainfall areas)* (75 : 50 : 50) 20
I Simple Fertilizers																				
(*a*) *Nitrogenous*																				
1. Ammonium Sulphate (20%N) √	65+60	150+150	125+125	100+100	125+125	100+200	100+75	100+150	125+75	125	100+100	100	100+100	100	150+150	100	65+125 +185+250	55+110 +165+220	65+125 +185+250	35+70 +115+155
2. Ammonium Sulphate Nitrate (26%N)	50+50	115+115	95+95	75+75	95+95	70+160	75+60	75+115	95+60	95	75+75	75	75+75	75	115+115	75	50+100 +140+190	45+85 +125+170	50+100 +140+190	30+60 +90+110
3. Calcium Ammonium Nitrate (20·5%N)	65+60	150+150	125+125	100+100	125+125	100+200	100+75	100+150	125+75	125	100+100	100	100+100	100	150+150	100	65+125 +185+250	55+110 +165+220	65+125 +185+220	35+70 +115+155
4. Urea (44%N)	30+30	65+65	60+55	45+45	60+55	40+90	45+35	45+70	55+35	60	45+45	45	45+45	45	65+65	45	25+60 +85+115	25+50 +75+100	25+60 +85+115	15+35 +50+70
(*b*) *Phosphatic*																				
1. Super Phosphate (16% P_2O_5) +	95	190	155	190	155	190	125	190	190	95	155	65	125	125	250	65	250	190	190	310
2. Basic Slag (16% P_2O_5)	95	190	155	190	155	190	125	190	190	95	155	65	125	125	250	65	250	190	190	310
(*c*) *Potassic*																				
1. Muriate of Potash (60% K_2O) ●	25	50	40	60	40	25	15	25	25	15	15	—	35	15	50	—	85	125	50	85
2. Sulphate of Potash (50% K_2O)	30	60	50	70	50	30	20	30	30	20	20	—	40	20	60	—	100	150	60	100
II Compound Fertilizers																				
(a) Ammo. Phosphate (16% N, 20% P_2O_5)	75	150	125	125	125	125	100	125	150	75	125	50	100	100	200	50	75	70	75	50
+ Ammonium Sulphate	—+60	30+150	25+125	—+100	25+215	—+200	20+75	—+150	5+75	65	—+100	60	60+100	20	—+140	60	—+125 +185+250	—+110 +165+220	—+125 +185+250	—+70 +115+155
+ Super Phosphate	—	—	—	30	—	30	—	30	—	—	—	—	—	—	—	—	150	100	95	250
+ Muriate of Potash	25	50	40	60	40	25	15	25	25	15	15	—	35	15	50	—	85	125	50	85
(b) Di-Ammo. phos. (18%N, 46% P_2O_5)	35	65	55	65	55	65	40	65	65	35	55	20	45	45	85	20	65	60	65	45
+ Ammonium Sulphate	30+60	90+150	75+125	40+100	75+125	40+200	65+75	40+150	65+75	95	50+100	80	60+100	60	70+150	80	—+125 +185+250	—+110 +165+220	—+125 +185+250	—+70 +115+155
+ Super Phosphate	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	60	10	—	180
+ Muriate of Potash	25	50	40	60	40	25	15	25	25	15	15	—	35	15	50	—	85	125	50	85
(c) Complex Fertilizer (17:17:17)	75	175	145	120	145	90	60	90	90	60	60	—	120	60	175	—	75	65	75	40
+ Ammonium Sulphate	—+60	—+150	—+125	—+100	—+125	25+200	50+75	25+150	50+75	75	50+100	—	—+100	50	—+150	—	—+125 +185+250	—+110 165+220	—+125 +185+250	—+70 +115+155
+ Super Phosphate	10	—	—	65	—	95	65	95	95	30	95	—	—	65	65	—	170	120	120	230
+ Muriate of Potash	5	—	—	25	—	—	—	—	—	—	—	—	—	—	—	—	60	105	30	65
(d) Complex Fertilizers (14:28:14)	55	110	90	110	90	110	70	110	110	55	70	—	70	70	145	—	95	80	95	50
+ Ammonium Sulphate	25+60	75+150	60+125	25+100	60+125	25+200	50+75	25+150	50+75	90	50+100	—	50+100	50	50+150	—	—+125 +185+250	—+110 +165+220	—+125 +185+250	—+70 +115+155
+ Super Phosphate	—	—	—	—	—	—	—	—	—	—	30	—	—	—	—	—	85	50	25	225
+ Muriate of Potash	15	25	20	35	20	—	—	—	—	5	—	—	15	—	15	—	60	105	30	70

√ Nitrogen + Phosphorus ● Potash

Note : Fertilizer doses have been adjusted to round figures for the convenience of farmers.

FERTILIZER READY RECKONER—KGS. PER ACRE

FERTILIZERS	G. Nut (Irrigated) (10: 30: 10) (Northern Dist.) 21	G. Nut (Irrigated) (10: 30: 15) Southern Dist.) 22	G. Nut (Dry) (10: 20: 10) 23	Cotton (Irrigated) (30: 15: 15) 24	Cotton (Dry) (15: 10: 15) (Transition Area) 25	Cotton (Dry) (10: 10: 5) (Scanty rainfall) area 26	Sea Island Cotton (Irrigated) (40: 20: 40) 27	Sea Island Cotton (Dry) (20: 15: 30) 28	Hybrid Cotton (Irrigated) (60: 30: 30) 29	Castor (Irrigated) (25: 25: 10) 30	Castor (Dry) (15: 15: 10) 31	Bengal Gram (5: 10: 0) 32	Safflower (Irrigated) (30: 30: 15) 33	Safflower (Dry) (15: 20: 10) 34	Cow pea (10: 20: 10) 35	Red Gram (10: 20: 10) 36	Tobacco Cigarette (30: 32: 24) 37	Tobacco Bidi (24: 8: 8) 38
I Simple Fertilizers																		
(a) *Nitrogenous* √																		
1. Ammonium Sulphate (20%N)	50	50	50	75+75	75	50	100+100	50+50	150+150	65+60	40+35	25	150	75	50	50	100+50	80+40
2. Ammonium Sulphate Nitrate (26%N)	35	35	35	60+40	60	35	75+75	40+35	115+115	50+45	30+25	20	115	60	35	35	75+40	60+30
3. Calcium Ammonium Nitrate (20·5%N)	50	50	50	75+75	75	50	100+100	50+50	150+150	65+60	40+35	25	150	75	50	50	100+50	80+40
4. Urea (44%N)	25	25	25	35+30	35	25	45+45	25+20	65+65	30+25	20+15	10	65	35	25	25	45+25	35+20
(b) *Phosphatic* +																		
1. Super Phosphate (16% P_2O_5)	190	190	125	95	65	65	125	95	190	155	95	65	190	125	125	125	200	50
2. Basic Slag (16% P_2O_5)	190	190	125	95	65	65	125	95	190	155	95	65	190	125	125	125	200	50
(c) *Potassic* ●																		
1. Muriate of Potash (60% K_2O)	15	25	15	25	25	10	70	50	50	15	15	—	25	15	15	15	40	15
2. Sulphate of Potash (50% K_2O)	20	30	20	30	30	10	80	60	60	20	20	—	30	20	20	20	48	15
II Compound Fertilizers																		
(a) Ammo. Phosphate (16% N, 20% P_2O_5)	60	60	60	75	50	50	100	60	150	80	50	30	150	100	60	60	125	40
+ Ammonium Sulphate	—	—	—	15+75	35	10	20+100	—+50	30+150	—+60	—+35	—	30	—	—	—	—+50	50+40
+ Super Phosphate	110	110	50	—	—	—	—	20	—	55	30	25	—	—	50	50	45	—
+ Muriate of Potash	15	25	15	25	25	10	70	50	50	15	15	—	25	15	15	15	40	15
(b) Di-Ammo. Phos. (18%N, 46% P_2O_5)	55	55	45	35	20	20	45	35	65	55	30	20	65	45	45	45	70	15
+ Ammonium Sulphate	—	—	10	45+75	55	30	60+100	20+50	90+150	15+60	40+60	5	90	35	10	10	35+50	65+40
+ Super Phosphate	30	30	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
+ Muriate of Potash	15	25	15	25	25	10	70	50	50	15	15	—	25	15	15	15	40	15
(c) Complex Fertilizer (17:17:17)	60	60	60	90	60	30	120	60	175	60	45	—	90	60	60	60	120	45
+ Ammonium Sulphate	—	—	—	—+75	25	25	—+100	—+50	—+150	15+60	—+35	—	75	25	—	—	—+50	40+40
+ Super Phosphate	125	125	65	—	—	30	—	30	—	95	45	—	95	65	65	65	75	—
+ Muriate of Potash	—	10	—	—	10	—	35	35	—	—	5	—	—	—	—	—	5	—
(d) Complex Fertilizers (14:28:14)	70	70	70	55	35	35	70	55	105	70	55	—	110	70	70	70	115	30
+ Ammonium Sulphate	—	—	—	40+75	25	25	50+100	15+50	75+150	15+60	—+35	—	75	25	—	—	20—50	60+40
+ Super Phosphate	125	65	—	—	—	—	—	—	—	30	—	—	—	—	—	—	—	—
+ Muriate of Potash	—	10	—	15	15	—	50	40	25	—	5	—	—	—	—	—	15	5

√ Nitrogen + Phosphorus ● Potash

Note : Fertilizer doses have been adjusted to round figures for the convenience of farmers.

PESTICIDES – THEIR COMMON NAMES AND TRADE NAMES

	Common name	*Trade name*
1.	Aldrin	Aldrin, Aldrex, Gopaldrin, Hexamar, Aldrin, Aldrin Sandoz, Micoaldrin, Lethalrockaldrin.
2.	Aluminium Phosphide	Phostaxin, Celphos.
3.	B.H.C.	Gamexane, Hexachlor, Benzixhlor, Benzex, Hexidol, Hexmar BHC, Intox BHC, Micosane, Letholrock BHC.
4.	D.D.T.	Lotexdit, Didimac, Guesarol, Hexamar DDT, Intox D.D.T., Letholrock, Neocid.
5.	Chlordane	Hexamar Chlordane, Micochlordane, Intox chlordane, Letholrock Chlordane.
6.	Carbophenothion	Trithion, Hexathion.
7.	Dimethoate	Rogor, Cygon, Hexagor.
8.	Dichlorvas	D.D.V.P. Nuvan, Marvex.
9.	Dieldrin	Dieldrin, Dieldrex, Gopdieldrex Hexamar Dieldrin, Letholrock Dieldrin, Micodioldrin.
10.	Diazinon	Basudin.
11.	Endrin	Endrex, Tafadrin, Enzex, Micoendrin, Hexadrin, Gopendrin, Endrin Sandoz.
12.	Parathion	Paramar, Folidol, Ekatox, Thiophos, Micoparathion, Peratex.

13.	Endosulfan	Thiodan, Hexasulfan.
14.	Fenitrothion	Sumathion, Accothion, Folithion.
15.	Heptachlor	Mico Heptachlor, Hexamar Heptachlor Heptaf.
16.	Lindane	Lindane, Hexamar Lindane.
17.	Malathion	Mico Malathion, Malathion Sandoz, Meltex, Letholrock Malathion, Malamar.
18.	Menazon	Syfos.
19.	Phosphomedon	Dimecron.
20.	Phorate	Thimet.
21.	Thiometon	Ekatin, Hexatin.
22.	Disulfotan (Thio-demeton)	Solvirex, Disyton, Systox.
23.	Formothion	Anthio, Ekatin–M.
24.	Oxydameton-methyl or Demeton-methyl	Metasystox.
25.	Trichlorfon (Trichlorphon)	Diptrex.
26.	Carbaryl	Sevin, Hexavin, Carbaryl Sandox.
27.	Furadon	Carbofuran.
28.	Copper Oxychloride	Blitox, Fytoloan, Cupramar, Copex, Kirthi copper, Shell copper, Micop Anrucop,
		Cuprokylt, Blue copper 50, Cupravit, Blimix, Parrycop.
28.	(*a*) Cuprous oxide	Copper sandoz dust, coppesan, fungimar, Fytomix.
29.	Captan	Captan.

30.	Ferbam.	Ferbam, Hexaferb.
31.	Thiram	Thiram, Hexathir, Thirade.
32.	Organo-mercurial compounds	
	(*i*) Phenyl mercury accetate.	Ceresan dry.
	(*ii*) Methoxy Ethyl chloride	Ceresan wet.
	(*iii*) Phenyl mercuric accetate Plus ethyl mercury Chloride	Agrosan G. N., Hexason.
	(*iv*) Methoxy ethyl	Aretan.
	(*v*) Mercury Chloride	Tafsan, Agallol, Seedrex, Tillox, Shell Seed dresser.
33.	Zineb-78	Dithane Z-78. Hexathane, Blizene.
34.	Ziram	Zirade, Cuman, Hexazir, Zerlate.
35.	Maneb	Dithane-M-22.
36.	Wettable sulphur	Cosan, Mico wettable sulphur, Thiovit Microsul, Sulkal, Sultaf, Hexasal, Solbar, Spersul, Spitox, Sulfex.
37.	Sulphur dust	Sulphur dust.
38.	Hinosan	Hinosan.
39.	Fanthion	Lebaycid.
40.	Zinc Phosphide	Ratox, Rod
41.	Anticoagulants	Ralafin, Warfarin.
42.	F.D.B. ampuls	E.D.B. ampoules, Celmide.
43.	Kasumin	Kasumin
44.	Antibiotics	Streptocycline, Kasumin, Aurofungin.

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